



2017 IEEE Radio & Wireless Week



ADVANCE PROGRAM

Phoenix, Arizona USA

Hyatt Regency

15-18 January, 2017

RWW & RWS

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MIT Lincoln Laboratory

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2017 Radio & Wireless Week Sponsor:

IEEE Microwave Theory and Techniques Society (MTT-S)

<http://www.radiowirelessweek.org>



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General Chair's Invitation to the IEEE Radio and Wireless Week



Jeremy Muldavin
General Chair

ADVANCE REGISTRATION

Advance registration for RWW 2017 is open now until **6 January 2017**. Register now to take advantage of the early registration pricing!

Please visit <http://www.radiowirelessweek.org> and follow the registration links.

I have the great honor and pleasure to invite you to the 2017 IEEE Radio & Wireless Week (RWW2017). This will be the 11th anniversary of RWW and the second time in Phoenix, Arizona since 2006.

RWW2017 will be held at the Hyatt Regency in Phoenix on 15 - 18 January, 2017. The venue is located in downtown Phoenix next to the convention center with numerous culinary and entertainment options. With many wireless semiconductor companies, a plethora of startups, as well as excellent universities such as Arizona State University nearby, Phoenix will be a great location for all the attendees. RWW2017 consists of five related conferences that focus on the intersection between wireless communication theory, systems, circuits, and device technologies, creating a unique forum for engineers to discuss various technologies for state-of-the-art wireless systems and their end-use applications. The conference bridges the gaps between digital, RF, hardware, and software, which all need to be seamlessly combined to keep the wireless industry and mobile applications growing.

RWW's multidisciplinary events bring together innovations that are happening across the broad wireless spectrum. It is our hope that RWW is a place where you will not only find discussions of present problems, but you will also be inspired by the diverse technical contents that might spark ideas for future research.

In addition to traditional podium presentations and poster sessions, there will be a track for IEEE Distinguished Lectures, Sunday half day workshops, panels, industry exhibits, WirelessApps industry presentations, and a demo session. A highlight on Tuesday will be the plenary talk. Also on Tuesday afternoon, in its sixth year, there will be a demo session where presenters can bring in a demonstration of their latest wireless experiments for a hands-on interactive forum. Demo sessions are particularly in keeping with the spirit of RWW because we get to see and feel how people are tackling real-world problems to address the next wireless innovations.

To support and encourage students pursuing a career in a wireless area, each conference will have a student paper competition with awards that will be presented at the Tuesday banquet. On Monday afternoon, all student paper competition finalists will present their work in the poster session. I encourage you to check out what the next generation of wireless engineers are working on.

In conclusion, I invite you to join us for four days of great technical presentations, discussions, networking, and some fun in warm Phoenix, Arizona, 15-18 January 2017.

RWW2017 General Chair
Jeremy Muldavin

Hyatt Regency Phoenix Official RWW 2017 Meeting Venue

The RWW 2017 Planning Committee has secured a favorable rate for all RWW attendees at the Hyatt Regency Phoenix. In order to receive the special rate, please book your accommodations by Tuesday, 20 December 2016 at 5:00 PM (Mountain Time Zone). Please note the discounted rates (\$199) are only available over official Symposium dates. For reservations outside the official dates or for government rates please contact the hotel directly.

Mention "IEEE RWW 2017" to receive the negotiated room rate. Alternatively, visit <http://www.radiowirelessweek.org> and follow the attendees links. Reservation requests received by the hotel after 20 December 2016 will be accepted on a space and rate available basis, and the group rate may not apply.



2017 Radio & Wireless Week Highlights

SUNDAY, 15 JANUARY 2017
(13:30-17:30)

Workshop

Inkjet and 3D printed electronics for the Internet of Things and 5G communication systems

Organizers:
Apostolos Georgiadis, Heriot-Watt University

Manos Tentzeris, Georgia Institute of Technology

Abstract:

Additive manufacturing techniques such as inkjet printing and 3D printing emerge as low cost, high performance technologies for RF electronics, with applications ranging from sensors to antennas, front-ends and packaging solutions from RF to millimeter wave frequencies. Additive manufacturing provides a platform for heterogeneous integration of complex circuit structures, materials including metals, dielectrics and semiconductors and packages, from superstrate lens structures, antennas and passive microwave circuits in general, to multilayer systems on package including 3D printed packaging and interconnects integrating active devices and MMICs, as well as digital and power signals and thermal management. Inkjet/3D printing technologies are able to deliver such complex systems in a single process with low cost and reduced production time.

The workshop will present recent advances in circuit and system implementations and will discuss challenges and future trends. Starting from an introduction providing a perspective of inkjet/3D printing capabilities and present challenges, the speakers will present a multitude of recently published circuit examples, ranging from fully printed millimeter wave patch antennas and arrays, 3D printed microwave antenna array structures and lenses, to microfluidic structures and sensors, and microwave and millimeter wave interconnects with a vision of revolutionizing supply chain to a low cost, rapid, on-demand model and furthermore providing an enabling technology for 5G systems.

Workshop

Techniques for High Efficiency Linear Power Amplification of 5G Signals

Organizer:
Roman Maršálek, Brno University of Technology

Abstract:

The requirements imposed by the scenarios expected for 5th generation of communication standards cannot be met by OFDMA used nowadays in the 4G systems, such as LTE. Specifically, the use of OFDMA leads to low spectrum and power efficiency of RF transmitters. Moreover, OFDM cannot support low latency and asynchronous communications – the key enablers of IoT technology. Currently, research institutions worldwide, as well as leading companies in the mobile communication sector are close to defining waveform candidates for the incoming post-OFDM era. As a result, many works have been published on GFDM, UFMC, Filtered OFDM, NC-OFDM, etc. Nevertheless, the advantages of these new waveforms, can easily be smeared out by the imperfections of the transceiver analog components, e.g. a power amplifier (PA).

The workshop will thus be dedicated to the techniques and transceiver architectures for efficient amplification of 5G candidate signals. It will start with an overview of the architectures for power amplifier linearization (Doherty, Linc, Envelop tracking, etc.) in the context of 3G/4G/5G systems. An important part of the workshop will be dedicated to the digital predistortion of 5G signals, with the focus on the implementation aspects, such as the computational complexity, stability of PA inverse function solutions or the front-end imperfections' influence on the linearization performance. A remote experiment with the digital predistortion setup will also be presented to the attendees. As an important part of the workshop, the peak to average power ratio (PAPR) of the post-OFDM waveforms and strategies to meet both spectrum and power efficiencies for 5G transmitters will be discussed.

Workshop

High speed Optical Communications and Opto-electrical Component Technologies for 400 Gbit/s and Beyond

Organizer:
Koichi Murata, GigPeak Inc.

Noriaki Kaneda, Alcatel Lucent Bell Laboratories, Nokia

Abstract:

Rapid increase of the data traffic in communication systems strongly demands more economical, higher frequency efficient and larger capacity for optical transmission systems. The first QPSK 100G coherent technology was successfully deployed in DWDM systems, and it becomes the most dominant technology in the long haul (>600km) and metro regional (100km to 600km) area optical links. The feasibility study of 400G coherent system has been completed based on higher order modulation format like 16 QAM, and the industry has started to the development of economical 400G coherent systems with small form factor transceivers and optical modulators. In addition, a combination of the spatial multiplexing using multi-core fiber and advanced high-speed, higher order modulation format are significantly investigated to realize future tera-bit/s class optical transmission capacity.

This workshop will cover the key technologies supporting the cutting-edge optical transmission systems, including high-speed digital signal processing technology to optimizing the optical network performance, high-speed analog to digital and digital to analog converter technology, opto-electrical technologies miniaturizing optical transceiver and module. The scope of the workshop addresses to review the state-of-art-technology from the expert's presentation, and to discuss the technical issues towards future Tera-bit systems. It would be an interesting opportunity for Microwave community to gain insight into the new direction in optical communications area as well as ultrahigh-speed opto-electrical interfaces technologies. The final aim of this workshop is to give a new perspectives and to promote the involvement of the microwave community in the optical transmission research area.

Talks and Speakers:

Introduction to Inkjet and 3D Printed Circuits for Energy Harvesting, Sensing and Communication
Apostolos Georgiadis, Heriot-Watt University

3D/Inkjet Printed Packaging, Antenna, and Front-End Structures for Flexible, Wearable, Implantable, and Morphing Communication and Sensing Modules from RF to Millimeter Waves
Manos Tentzeris, Georgia Institute of Technology

Microwave and mm-Wave Applications of 3D Multi-Material Digital Printing for Antennas and Circuit Components
Thomas Weller, University of South Florida

3D Printed Antennas for Wireless Power Transfer
Nuno Carvalho, University of Aveiro

Printed Electronics, an Industrial Revolution in Manufacturing and Supply Chain
Ben Cook, Texas Instruments

Talks and Speakers:

Architectures for Power Amplifier Linearization (Doherty, Linc, Envelop Tracking, etc.) in the Context of 3G/4G/5G Systems
Geneviève Baudoin, Université Paris-Est, ESIEE Paris

Digital Predistortion Basics, Overview of Methods, Challenges (Front-End Imperfections, Timing Mismatch, etc.), DPD Structures and Identification
Roman Maršálek, Brno University of Technology

Implementation Aspects of Digital Predistortion (Computational Complexity, Stability of Solutions, Multiple Solutions, etc.), Remote Experiments with Digital Predistortion Setup
Tomáš Göthans, Brno University of Technology

PAPR Overview of Post-OFDM Waveforms (FBMC, UFMC, GFDM, Filtered OFDM, NC-OFDM, etc.) and Strategies to Meet both Spectrum and Power Efficiencies for 5G Transmitters
Yves Louet, CentraleSupélec

Talks and Speakers:

Advanced Digital Coherent Technology Towards Tera-bit/s/ch Optical Transport Network
Fukutaro Hamaoka, NTT Network Innovation Laboratories

Digital Signal Processing Technologies
Noriaki Kaneda, Alcatel Lucent Bell Laboratories, Nokia; Peter Schvan/Ciena

High-speed Si-based A/D and D/A Converters
Munehiko Nagatani, NTT Device Technology Laboratories

InP-HBT-based Ultra-broadband Sampling Circuits for DA and AD Conversion Subsystems
Munehiko Nagatani, NTT Device Technology Laboratories

Transmitters and Receivers for Optical Links Beyond 100 Gb/s
Manfred Berroth, Universität Stuttgart

2017 Radio & Wireless Week Highlights

SUNDAY, 15 January
(18:00-19:00)

IoT Talk

**The Internet of Things -
Powered by Wireless**

Speaker: Mark Goldstein, President of International Research Center

Abstract: The next Internet wave, the Internet of Things (IoT), will connect tens of billions of new sensors and devices in the coming years driving sustainability while transforming home, business, government, industrial, medical, transportation, and other complex ecosystems. The presentation will examine how IoT will be implemented and monetized across a various application spaces, creating new business models from pervasive sensor deployments and data gathering, accompanied by new privacy and security risks. Explore IoT's evolving wireless protocols, their pro and cons, and deployment prospects including the impact of 5G, as well as roadblocks and operational challenges, emerging standards and protocols, gateways and ecosystem integration, big data strategies, and analytic opportunities.

Biography: Mark is a technophile and technology visionary, activist, advisor, and entrepreneur with extensive experience and connections throughout myriad technology sectors. He has provided consulting, custom research, and strategic support for business, legal, and public policy clients across a variety of technology disciplines and arenas since 1992 following an engineering management career. He is involved with a number of policy, economic development, professional, and trade groups, and a frequent speaker and trainer.

MONDAY, 16 January
(08:00-11:50) &
(15:40-16:40)

**RWW Student
Paper Contest**

Student Paper Contest Chair:
Holger Maune, TU of Darmstadt

The RWW Student Paper Contest provides students with the opportunity to share their work and discuss their results with experts from industry and academia. It is open to all students attending the RWW and presenting a paper at one of the topical conferences (RWS, PAWR, WiSNet, SiRF, and TWIoS). Starting from 2017, the Steering Committee established a new format for the contest, making it a single event for the whole RWW. Ten finalists will be chosen overall, and the two best papers from the whole RWW will be awarded at the Awards Banquet. The finalists will be asked to give a 20 minute oral presentation during one of two dedicated oral sessions on Monday morning, as well as present a poster at the Finalists' Interactive Poster Session on Monday afternoon. The judges will grade the papers in the following areas: novelty of the research, quality of the oral presentation, quality of the poster, quantity and quality of information presented, preparedness of the presenter and the student's performance in the Q&A session. The two best student papers of the whole RWW will be awarded at the Awards Banquet, which takes place on Tuesday evening. The first authors of the Student Paper Finalist papers are invited for the dinner at no extra cost.

MONDAY, 16 January
(16:40-18:40)

Workshop

**Shaping the Career with
Next Generation RF
Technologies**

Organizers:

Tushar Sharma, University of Calgary
Ibrahim Khalil, NXP Semiconductors

Abstract:

Join technology leaders, experts, top level executives and academic researchers at an interactive industrial forum organized by IEEE MTT-S Young Professionals in Microwaves. This workshop aims to provide a window into the technologies, strategies, and policies that will shape next-generation RF solutions in a new era of state-of-art wireless systems and their end-use applications. Get a chance to share your knowledge with others, directly speak and network with the big giants in RF industry to shape your career. Learn how to grow in your career and make yourself fit for upcoming RF industrial challenges. The panel also aims to educate young professionals about the industrial requirements, challenges, and emerging job opportunities. Getting acquainted with industry professionals will help in seeking the right path and understanding the challenges one can face in the most dynamic global industry. Lets educated , empower and enlighten the future generations by kicking off industry engagement during Radio Wireless Week.

MONDAY, 16 January
(19:00-20:30)

Panel

**Linearization of power
amplifiers in 5G**

Moderator:

Neil Braithwaite, Consultant

Panelists:

Anding Zhu, University College Dublin
Allen Katz, Linearizer Technology
Jose Carlos Pedro, University of Aveiro
John Wood, Obsidian Microwave

Abstract:

5G mobile networks seek to improve data throughput over the current 4G systems. Large bandwidths available at millimeter wave frequencies will be exploited. Massive MIMO is proposed to connect base stations to several users simultaneously by using beamforming to minimize interference. Unfortunately, it is challenging to transmit signals with large bandwidths and signal peaks without producing interference such as intermodulation and harmonic distortion (IMD and HD). Coupling between neighboring antennas may complicate this further. This panel will discuss linearization techniques suitable for 5G transmitters to minimize IMD and HD.

TUESDAY, 16 January
(10:10-11:50)

Plenary Session

Join us for the Radio and Wireless Week 2017 plenary session where we will introduce the exciting schedule of talks and workshops for the week, as well as a message from the MTT-S President. The plenary session will also feature a keynote presentation by:

Jayne Stancavage
Senior Manager-Spectrum Policy (ITU-R),
Intel Corporation

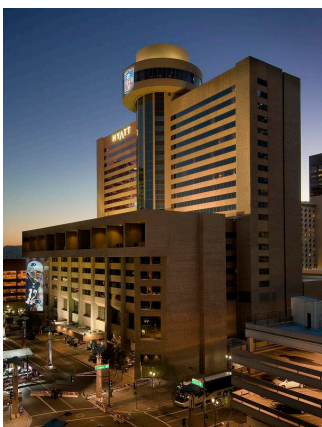
Jayne is a member of the Working Party 5D (WP 5D) - IMT Systems Management team. WP 5D is responsible for the overall radio system aspects of the International Mobile Telecommunications (IMT) systems, comprising IMT-2000, IMT-Advanced and IMT for 2020 and beyond.

As a new addition to the Radio and Wireless Week, The Wireless Internet of Space (TWIoS), will have a special introduction from Topical Conference Co-chair Charlie Jackson. As a special treat, Durrell Hillis, author of the recent book "Creating Iridium", will preview his TWIoS keynote presentation on the challenges and success in of the creation of the path breaking satellite-to-mobile communication system.

TUESDAY, 17 January
(18:30-21:00)

Joint RWW Banquet

Join your friends, co-workers and fellow researchers in an informal setting of lively discussion, dinner and wine. In addition, see the student paper award winners from the RWS, PAWR, WiSNet, TWIoS and SiRF receive their awards.



**The Hyatt Regency in
Phoenix, AZ provides a stunning
venue for RWW2017!**



RWW Session: MO1A

RWW Distinguished Lectures I

RWS Session: MO1B

Advanced Reconfigurable RF/Microwave Electronics

PAWR Session: MO1D

Distortion Reduction Techniques in RF Power Amplifiers

08:00

MO1A-1 Design of millimetre-wave multifunction integrated circuits for data communication and remote sensing applications

H. Zirath, Chalmers University

Abstract: Recent results from ongoing projects aiming at enabling new applications for next generation mobile infrastructure, 5G, and imaging, up to 340 GHz will be reported. So far, critical building blocks such as LNA, PA, VCO, modulator and demodulator, frequency multiplier, power detector and mixer have recently been developed, and results will be reported. Multifunction front-end circuits such as complete receive and transmit RFICs, mixed signal designs for co-integrated baseband/frontend ICs, and radiometer ICs have also been developed and will be reported as well, including the newly developed D-band frontend chipset demonstrating state-of-the-art bitrate of beyond 40 Gbps.

MO1B-1 Frequency-Agile RF Filters Using Microfluidically Reconfigurable Selectively Metallized Plates (Invited)

T. Palomo, G. Mumcu, University of South Florida, Tampa, United States

MO1D-1 Digital Pre-Distortion of RF Power Amplifiers (Invited)

John Wood, Obsidian Microwave, LLC, Portland, United States

08:20

MO1B-2 Integration of Ferromagnetic and Ferroelectric Films for Fully Electrically Tunable RF Devices (Invited)

G. Wang, University of South Carolina, Columbia, United States

08:40

MO1A-2 Millimeter-wave and Terahertz Applications Enabled by Photonics

T. Nagatsuma, Osaka University

Abstract: This lecture presents how effectively photonics technologies are implemented not only in generation, detection and transmission of continuous millimetre waves (MMW) and terahertz (THz) waves, but also in system applications such as communications, measurements, spectroscopy and imaging to efficiently enhance their performance. After briefly reviewing key devices and components, first, wireless communications applications are discussed aiming at a data rate of terabit/s. Next, frequency-domain spectroscopy systems are presented. Finally, recent challenges in photonic integration technologies are described, which include monolithically integrated photonic signal generators, and hybrid integration schemes using, for example, photonic crystal platforms.

MO1B-3 Single/Multi-Band Multifunctional Passive Components with Reconfiguration Capabilities (Invited)

R. Gómez-García¹, D. Psychogiou², D. Peroulis³, ¹University of Alcalá, Madrid, Spain, ²University of Colorado Boulder, Boulder, United States, ³Purdue University, West Lafayette, United States

MO1D-2 Pruning Strategies for a Volterra Series Model used in Digital Predistortion (DPD) of RF Power Amplifiers (Invited)

R. N. Braithwaite, Consultant, Orange, United States

09:00

MO1B-4 Advanced Reconfigurable RF/Microwave Electronics (Invited)

M. Rais-Zadeh^{1,2}, ¹University of Michigan, Ann Arbor, United States, ²Jet Propulsion Laboratory, Pasadena, United States

MO1D-3 Power Adaptive Decomposed Vector Rotation Based Digital Predistortion for RF Power Amplifiers in Dynamic Power Transmission

Y. Guo, A. Zhu, University College Dublin, Dublin, Ireland

09:20

MO1D-4 Using Statistical Information for Fast Static DPD of RF PAs

F. M. Barradas, P. M. Lavrador, T. R. Cunha, J. C. Pedro, Universidade de Aveiro, Aveiro, Portugal

Exhibits/Wireless MicroApps/Demo

Industry Exhibits:
 Monday 16 January 13:00 - 17:30
 and Tuesday 17 January 10:00 - 17:30

Demo Session:
 Tuesday 17 January 13:30 - 15:10

RWW Session: MO2A

RWW Distinguished Lecturers II

RWS Session: MO2B

Emerging Wireless Technologies and Applications

SiRF Session: MO2C

Emerging MEMS-Based Circuits

PAWR Session: MO2D

High-Efficiency RF Power Amplifiers

10:10

MO2A-1 Gallium Nitride Power MMICs – Fact and Fiction

C. Campbell, Qorvo

Abstract: Gallium Nitride (GaN) based transistor technology's characteristics of very high current density combined with high voltage operation have held promise to vastly improve many microwave circuit applications that presently utilize Gallium Arsenide (GaAs) devices. The potential benefits of GaN device characteristics combined with monolithic microwave integrated circuit (MMIC) technology are many. The higher output power density of GaN devices should lead to greatly reduced die size for GaN implementations of existing power amplifier functions. In this talk, examples and scenarios are discussed highlighting the benefits and issues associated GaN MMIC technology.

MO2B-1 Fiber-Wireless Integration for Future Mobile Communications (Invited)

G-K. Chang, L. Cheng, Georgia Institute of Technology, Atlanta, United States

MO2C-1 Applications of Gallium Nitride in MEMS and Acoustic Microsystems (Invited)

M. Rais-Zadeh^{1,2}, ¹University of Michigan, Ann Arbor, United States, ²Jet Propulsion Laboratory, Pasadena, United States

MO2D-1 The Digital Power Amplifier for the Wireless Infrastructure: Status and Prospects (Invited)

A. Wentzel, F. Hühn, W. Heinrich Leibniz-Institut für Hochfrequenztechnik, Berlin, Germany

10:50

MO2B-2 One-Way Wireless Clock Transfer for Coherent Distributed Arrays

R. L. Schmid, T. M. Comberiate, J. E. Hodkin, J. A. Nanzer, Johns Hopkins University Applied Physics Laboratory, Laurel, United States

MO2C-2 Accurate calculation of MEMS varactor based VCO phase noise using Multitone-FM Analysis

G. Kahmen¹, H. Schumacher², ¹Rohde & Schwarz GmbH, Munich, Germany, ²Ulm University, Ulm, Germany

MO2D-2 Asymmetrical Outphasing: Exploiting Conjugate Continuous Modes of Operation

P.E. de Falco¹, J. Birchall¹, S. B. Smida¹, Kevin Morris¹, K. Mimis², G. Watkins², ¹University of Bristol, Bristol, United States, ²Toshiba Research Europe Limited, Bristol United Kingdom

11:10

MO2B-3 Signal Design and Figure of Merit for Green Communication Links

E. McCune, Eridan Communications, Santa Clara, United States

MO2C-3 High voltage level shifter for RF-MEMS control matrix with very low DC current leakage

C. Wipf, R. Sorge, IHP, Frankfurt (Oder), Germany

MO2D-3 3.0-3.6 GHz Wideband, over 46% Average Efficiency GaN Doherty Power Amplifier with Frequency Dependency Compensating Circuits

Y. Komatsuzaki¹, K. Nakatani¹, S. Shinjo¹, S. Miwa², R. Ma³, K. Yamanaka¹, ¹Mitsubishi Electric Corporation, Kamakura, Japan, ²Mitsubishi Electric Corporation, Itami, Japan, ³Mitsubishi Electric Research Laboratories, Cambridge, United States

11:30

MO2B-4 Efficiency Enhancement of M2M Communications over LTE using Adaptive Load Pull Techniques

J. Birchall, P.E. de Falco, K. Morris, M. Beach, University of Bristol, Bristol, United Kingdom

MO2D-4 A Novel Approach to Design a High Efficiency Class-E Power Amplifier over 87% Bandwidth

F. Tamjid, A. Ghahremani, M. Richardson, A.E. Fathy, University of Tennessee, Knoxville, United States

RWS Session: MO3A

Antennas, Arrays & MIMO

RWS Session: MO3B

Millimeter-Wave Wireless Links

SiRF Session: MO3C

Broadband & Photonics

PAWR Session: MO3D

RF Power Amplifier Technology

13:30

MO3A-1 Single-Layer Four-Beam Microstrip Antenna Array

I. Slomian, K. Wincza, S. Gruszczynski, AGH University of Science and Technology, Krakow, Poland

MO3B-1 Multi-Gigabit High-Range Fixed Wireless Links at High Millimeterwave Carrier Frequencies (Invited)

I. Kallfass¹, A. Tessmann², R. Henneberger³, ¹University of Stuttgart, Stuttgart, Germany, ²Fraunhofer Institute for Applied Solid State Physics, Freiburg, Germany, ³Radiometer Physics GmbH, Meckenheim, Germany

MO3C-1 Millimeter-wave Ultra-Broadband IQ Transceiver Design - Current Status and Future Outlook (Invited)

H. Alsuraissy¹, M-H. Wu², Wen-Jie Lin², Jeng-Han Tsai³, Tian-Wei Huang², ¹King Abdulaziz City for Science and Technology, Riyadh, Kingdom of Saudi Arabia, ²National Taiwan University, Taipei, Taiwan, R.O.C, ³Taiwan Normal University, Taipei, Taiwan, R.O.C

MO3D-1 Design of Linear and Efficient Power Amplifiers by Generalization of the Doherty Theory (Invited)

C. Fager¹, W. Hallberg¹, M. Özen¹, K. Andersson², K. Buisman¹, D. Gustafsson², ¹Chalmers University of Technology, Göteborg, Sweden, ²Ericsson AB, Göteborg, Sweden

13:50

MO3A-2 Orientation and Cancellation of Directional Interfering Signals Based on a Radio Frequency Beamforming Array

J. Chen¹, D. Ye¹, J. Hangfu¹, C. Li², L. Ran¹, ¹Zhejiang University, Hangzhou, China, ²Texas Tech University, Lubbock, United States

MO3B-2 Complete CMOS mmW links for consumer volume and cost structure (Invited)

J. Laskar, Maja Systems, Milpitas, United States

MO3C-2 A 28 Gb/s 3-V Optical Driver with High Efficiency in a Complementary SiGe:C BiCMOS Technology

P. Rito¹, I. García López¹, B. Heineemann¹, A. Awny¹, A. C. Ulusoy², D. Kissinger^{1,3}, ¹IHP, Frankfurt (Oder), Germany, ²Michigan State University, East Lansing, United States, ³Technische Universität Berlin, Berlin, Germany

MO3D-2 A UHF 1-kW Solid-State Power Amplifier for Spaceborne SAR

G. Formicone, J. Burger, J. Custer, Integra Technologies, Inc., El Segundo, United States

14:10

MO3A-3 A Comparison of Cross-over and Cross-talk Canceling Digital Predistorters for Multiple Antenna Transmitters

P. Suryasarman, M. Hoflehner, A. Springer, Johannes Kepler University, Linz, Austria

MO3B-3 Experimental Demonstration of a Dual-channel E-band Communication Link using Commercial Impulse Radios with Orbital Angular Momentum Multiplexing

H. Yao¹, H. Kumar¹, T. El¹, S. Sharma¹, R. Henderson¹, S. Ashrafi², D. MacFarlane³, Z. Zhao⁴, Y. Yan⁴, A. Willner¹, ¹University of Texas-Dallas, Richardson, United States, ²NxGen Partners LLC, Dallas, United States, ³Southern Methodist University, Dallas, United States, ⁴University of Southern California, Los Angeles, United States

MO3C-3 Sub-THz Source Integrated in Industrial Silicon Photonic Technology targeting High Data Rate Wireless Applications

E. Lacombe^{1,2}, F. Gianesello¹, C. Durand¹, G. Ducourmau³, C. Luxey², D. Gloria¹, ¹STMicroelectronics, Crolles, France, ²EpOC-UNS, Biot, France, ³IEMN, Villeneuve-d'Ascq, France

MO3D-3 A Highly Integrated RF Frontend Module including Doherty PA, LNA and Switch for High SHF Wide-band Massive MIMO in 5G

K. Nakatani¹, Y. Komatsuzaki¹, S. Shinjo¹, J. Kamioka¹, R. Komaru¹, H. Nakamizo¹, K. Miyawaki², K. Yamanaoka¹, ¹Mitsubishi Electric Corporation, Kamakura, Japan, ²Mitsubishi Electric Corporation, Itami, Japan

14:30

MO3A-4 Computational Electromagnetic Simulation and Performance Analysis of Reconfigurable Antennas for Outdoor 60 GHz Applications

O. Bshara, Y. Liu, S. Begashaw, K. R. Dandekar, Drexel University, Philadelphia, United States

MO3C-4 A 40 Gb/s PAM-4 Monolithically Integrated Photonic Transmitter in 0.25 μm SiGe:C BiCMOS EPIC Platform

I. García López¹, P. Rito¹, D. Petousi¹, L. Zimmermann¹, M. Kroh¹, S. Lischke¹, D. Knoll¹, A. Awny¹, A. C. Ulusoy², D. Kissinger^{1,3}, ¹IHP, Frankfurt (Oder), Germany, ²Michigan State University, East Lansing, United States, ³Technische Universität Berlin, Berlin, Germany

MO3D-4 100 MHz – 8 GHz Linear Distributed GaN MMIC Power Amplifier with improved Power-added-efficiency

J-S. Moon, J. Kang, D. Brown, R. Grabar, D. Wong, H. Fung, P. Chan, D. Le, H. Y. Tai, C. McGuire, HRL Laboratories, Malibu, United States

MO3A-5 Inter-symbol Interference Suppression Scheme Employing Periodic Signals in Coded Network MIMO-OFDM Systems

H. Suganuma, S. Saito, T. Maruko, F. Maehara, Waseda University, Tokyo, Japan

14:50

MO3A-5 Inter-symbol Interference Suppression Scheme Employing Periodic Signals in Coded Network MIMO-OFDM Systems

H. Suganuma, S. Saito, T. Maruko, F. Maehara, Waseda University, Tokyo, Japan

MO3B-3 Experimental Demonstration of a Dual-channel E-band Communication Link using Commercial Impulse Radios with Orbital Angular Momentum Multiplexing

H. Yao¹, H. Kumar¹, T. El¹, S. Sharma¹, R. Henderson¹, S. Ashrafi², D. MacFarlane³, Z. Zhao⁴, Y. Yan⁴, A. Willner¹, ¹University of Texas-Dallas, Richardson, United States, ²NxGen Partners LLC, Dallas, United States, ³Southern Methodist University, Dallas, United States, ⁴University of Southern California, Los Angeles, United States

MO3C-4 A 40 Gb/s PAM-4 Monolithically Integrated Photonic Transmitter in 0.25 μm SiGe:C BiCMOS EPIC Platform

I. García López¹, P. Rito¹, D. Petousi¹, L. Zimmermann¹, M. Kroh¹, S. Lischke¹, D. Knoll¹, A. Awny¹, A. C. Ulusoy², D. Kissinger^{1,3}, ¹IHP, Frankfurt (Oder), Germany, ²Michigan State University, East Lansing, United States, ³Technische Universität Berlin, Berlin, Germany

MO3D-3 A Highly Integrated RF Frontend Module including Doherty PA, LNA and Switch for High SHF Wide-band Massive MIMO in 5G

K. Nakatani¹, Y. Komatsuzaki¹, S. Shinjo¹, J. Kamioka¹, R. Komaru¹, H. Nakamizo¹, K. Miyawaki², K. Yamanaoka¹, ¹Mitsubishi Electric Corporation, Kamakura, Japan, ²Mitsubishi Electric Corporation, Itami, Japan

RWW STUDENT PAPER CONTEST

Oral Sessions: 08:00-09:40 and 10:10-11:50

Interactive Poster Session: 15:40 – 16:40

Chair: Holger Maune, TU Darmstadt

Each of the ten Student Paper Finalists for RWW2017 is required to prepare a 20 minute oral presentation and a poster for the competition. The two overall winners will be announced at the Awards Banquet on Tuesday evening. The first authors of the Student Paper Finalist papers are invited for the dinner at no extra cost.

PAWR Session: MO4D

Power Amplifier Modeling & System Analysis

15:40

MO4D-1 Direct Design of Doherty and Chireix PAs using a Nonlinear Embedding Device Model (Invited)

P. Roblin¹, H-C. Chang¹, C. Liang¹, R. Alsulami¹, F. Martinez-Rodriguez^{1,2}, J. A. Galaviz-Aguilar^{1,3}, ¹Ohio State University, Columbus, United States, ²National University of Mexico, Mexico City, Mexico, ³Instituto Politécnico Nacional, Tijuana, México

16:20

MO4D-2 Design of a Triple-Band Power Amplifier Using a Genetic Algorithm and the Continuous Mode Method

E. Arabi, P.E. de Falco, J. Birchall, K.A. Morris, M. Beach, University of Bristol, Bristol, United Kingdom

16:40

MO4D-3 A Low Complexity Multistandard Dual Band Wireless Transceiver with Integrated 24.7 dBm 54% Efficiency Polar PA in a 0.13 μm CMOS Technology

J. H. Mueller, M. Scholl, Y. Zhang, L. Liao, A. Atac, Z. Chen, B. Mohr, R. Wunderlich, S. Heinen, RWTH Aachen University, Aachen, Germany

17:00

MO4D-4 Improved Efficiency in Outphasing Power Amplifier by Mixing Outphasing and Amplitude Modulation

Y. Tajima¹, D. Wandre¹, Q-S. Schultz¹, T. Quach², P. Watson², W. Gouty², ¹InnoWave Inc., Merrimack, United States, ²Air Force Research Lab, WPAFB, United States



RWW2016 Student Paper Competition Finalists and Judges (Courtesy of LylePhotos, Atlanta)



RWW attendees will have the opportunity to enjoy the social and networking events on offer. (Courtesy of LylePhotos, Atlanta)

RWS Session: TU1A

Passives I

RWS Session: TU1B

5G

SiRF Session: TU1C

mmWave & THz Circuits

TWIoS Session: TU1D

Internet of Space

08:00

TU1A-1 Wearable Passive UHF RFID Tag based on a Split Ring Antenna

B. Waris, L. Ukkonen, J. Virkki, T. Björninen, Tampere University of Technology, Tampere, Finland

TU1C-1 30 Gbps Wireless Data Transmission with Fully Integrated 240 GHz Silicon Based Transmitter

J. Eisenbeis¹, F. Boes¹, B. Goettel¹, S. Malz², U. Pfeiffer², T. Zwick¹, ¹Karlsruhe Institute of Technology, Karlsruhe, Germany, ²University of Wuppertal, Wuppertal, Germany

TU1D-1 Liquid Crystal Technology for Reconfigurable SatCom Applications

H. Maune¹, C. Weickmann¹, M. Jost¹, R. Reese¹, M. Nickel¹, C. Fritzsche², R. Jakoby¹, ¹Technische Universität Darmstadt, Darmstadt, Germany, ²Merck KGaA, Darmstadt, Germany

08:20

TU1A-2 Fast, Low-profile and Small-sized Spiral-shaped Microstrip Line Antenna with Multi-band Operation in UHF Frequency Band

K. Nakajima¹, K. Kunishige¹, F. Kuroki¹, Y. Hamada², M. Numoto², ¹National Institute of Technology, Hiroshima, Japan, ²Mazda Motor Corporation, Hiroshima, Japan

TU1B-1 5G Standards Progress and Challenges (Invited)

T. Inoue, National Instruments, Austin, United States

TU1C-2 A Fully Differential 100 – 140 GHz Frequency Quadrupler in a 130 nm SiGe:C Technology for MIMO Radar Applications using the Bootstrapped Gilbert-Cell Doubler Topology

S. Kueppers¹, K. Aufinger², N. Pohl³, ¹Fraunhofer FHR, Wachtberg, Germany, ²Infineon Technologies AG, Neubiberg, Germany, ³Ruhr-University Bochum, Bochum, Germany

TU1D-2 Scandium-Doped Barium Hexaferrite Thin-Films for Nonreciprocal Satellite Components

F. K. H. Gellersen, J. Peschel, A. Ochsenfarth, A. F. Jacob, Institut für Hochfrequenztechnik, Hamburg, Germany

08:40

TU1A-3 3D Printed On-Package Tripolar Antennas for Mitigating Harsh Channel Conditions

R. A. Ramirez¹, M. Golmohamad², J. Frolík², T. M. Weller¹, ¹University of South Florida, Tampa, United States, ²University of Vermont, Burlington, United States

TU1B-2 Quantitative Analysis of the effects of Polarization and Pattern Reconfiguration for mmWave 5G Mobile Antenna Prototypes (Invited)

W. Hong, Pohang University of Science and Technology, Pohang, Republic of Korea

TU1C-3 Absolute mm-Wave Power Sensor Using a Switching Quad Output Stage

J. Wursthorn^{1,2}, H. Knapp², J. Al-Eryani¹, K. Aufinger², L. Maurer¹, ¹Universität der Bundeswehr München, Neubiberg, Germany, ²Infineon Technologies AG, Neubiberg, Germany

TU1D-3 Reconfigurable On-Board Processing for Flexible Satellite Communication Systems using FPGAs

A. Hofmann¹, R. Glein², L. Frank¹, R. Wansch¹, A. Heuberger², ¹Fraunhofer Institute for Integrated Circuits, Erlangen, Germany, ²Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen, Germany

08:40

09:00

TU1A-4 Broadband Printed-Dipole Antennas for Millimeter-Wave Applications

S. X. Ta, Ikmo Park, Ajou University, Yeongtong-gu, Suwon, Republic of Korea

TU1B-2 Quantitative Analysis of the effects of Polarization and Pattern Reconfiguration for mmWave 5G Mobile Antenna Prototypes (Invited)

W. Hong, Pohang University of Science and Technology, Pohang, Republic of Korea

TU1C-4 An Integrated 240 GHz Differential Frequency Sixtupler in SiGe BiCMOS Technology

A. Ergintav¹, F. Herzel¹, J. Bomgraber¹, D. Kissinger^{1,2}, H. J. Ng¹, ¹IHP, Im Technologiepark, Frankfurt, Germany, ²Technische Universität Berlin, Einsteinufer, Berlin, Germany

TU1D-4 Right and Left circular polarized wave antenna system

T. Kaneko¹, H. Saito², ¹Nihon University, Japan, ²Japan Aerospace Exploration Agency, Japan

09:20

TU1C-5 A SiGe:C BiCMOS Driver/Balun/Switch Function Block for a 30 GHz Satcom Transmit Array

I. Somesanu, H. Schumacher, Ulm University

TU1D-5 Systems Engineering Of Digitally Beam Formed Electronically Scanned Phased Arrays for Terabit per Second Satellites

R.L. Sturdivant¹, Luke Miller², E.K.P. Chong³, ¹MPT Inc., Fullerton, United States, ²Xilinx Inc., Irving, United States, ³Colorado State University, Fort Collins, United States

RWS Session: TU3A

3D & Novel Engineered Materials

RWS Session: TU3B

Terahertz Communications

RWW Joint Session

Demo Track

TWIoS Session: TU3D

TWIoS Keynotes

13:30

TU3A-1 Fabrication and Characterization of CPW Transmission Lines With CoFe₂O₄ Nanomagnetic Thin Films

Y. He¹, S. Pavlidis², W. Chen², E. Drew², Z. J. Zhang,² J. Papapolymerou¹,¹Michigan State University, East Lansing, United States, ²Georgia Institute of Technology, Atlanta, United States

TU3B-1 Experimental study of the receive signal quality dependence on modulation format and Baud rate in a 300 GHz Fixed Wireless Link

I. Dan¹, S. Rey², T. Merkle³, T. Kurner², I. Kalfass¹,¹University of Stuttgart, Germany, ²Technische Universitat Braunschweig, Germany, ³Fraunhofer Institute of Applied Solid State Physics IAF, Freiburg, Germany

Demo Track Chairs:
*Changzhi Li, Texas Tech University
 Alexander Koelpin, University of Erlangen-Nuremberg
 Jeffrey Pawlan, Pawlan Communications*

Scheduled for 13:30-15:10

RWW has a tradition of hosting a "Demo Track", with the purpose of providing an interactive venue for you to demonstrate the results of your research in a different form than the usual paper or poster formats. The demonstrations should include real operating hardware and/or software. We are also calling for live demonstrations of experiments or research by high school students on any topic of electronics and electrical engineering.

TU3D-1 Challenges of New Space (Keynote)

T. Burrell, Keysight Technologies, United States

13:50

TU3B-2 W-Band InP Transmission Line Metamaterial

V. Nguyen, N. Caira, J. Hester, D. DiMarzio, E. Kaneshiro, A. GutierrezAitken, V. Radisic, Northrop Grumman Aerospace Systems, Redondo Beach, United States

TU3B-2 Carrier Recovery For Sub-Millimeterwave Wireless Transmission

N. Neumann, T. B. Keuter, M. Laabs, Dirk Plettemeier, Technical University, Dresden, Germany

Demo Track

RWW has a tradition of hosting a "Demo Track", with the purpose of providing an interactive venue for you to demonstrate the results of your research in a different form than the usual paper or poster formats. The demonstrations should include real operating hardware and/or software. We are also calling for live demonstrations of experiments or research by high school students on any topic of electronics and electrical engineering.

TU3D-1 Challenges of New Space (Keynote)

T. Burrell, Keysight Technologies, United States

14:10

TU3A-3 3-D Printed Substrates for MMIC Packaging

S. Pavlidis¹, B. Wright², J. Papapolymerou²,¹Georgia Institute of Technology, Atlanta, United States, ²Michigan State University, East Lansing, United States



The Demo Track offers academic researchers the opportunity to showcase their latest hardware to RWW attendees.

TU3D-1 Creating Iridium (Keynote)

D. Hillis, Motorola Space and Defense Group (Retired), United States

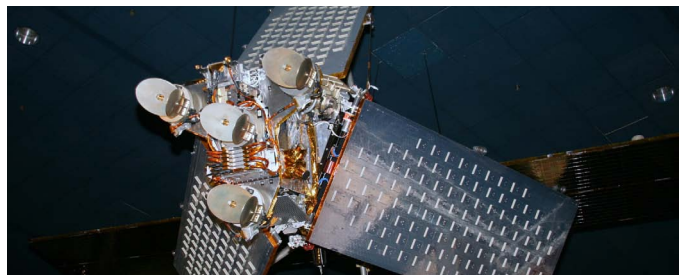
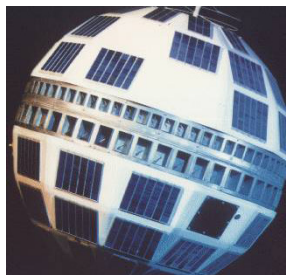
14:30

TU3A-4 A Low-Cost, Single Platform, Hybrid Manufacturing System for RF Passives

D.L. Revier, M.M Tentzeris, Georgia Institute of Technology, Atlanta, United States

(Right) Telstar was launched in 1962 and weighed 77 kilograms

(Far right) Iridium was launched starting in 1997, and weighed 689 kilograms



TU3P: Joint RWW Interactive Poster Session
13:30-15:10

Forward Modeling Assisted 1-Bit Data Acquisition Based Model Extraction for Digital Predistortion of RF Power Amplifiers

H. Wang^{1,2}, G. Li^{1,2}, Y. Zhang^{1,2}, F. Liu^{1,2}, A. Zhu³, ¹University of Science and Technology of China, Hefei, China, ²Key Laboratory of Electromagnetic Space Information, Chinese Academy of Sciences, Hefei, China, ³University College Dublin, Ireland

Multi-Cell Harmonics and Intermodulation Compensation Architecture for Concurrent Dual-Band Transmitters

C. Li¹, Y. Yamao², S. He¹, ¹University of Electronic Science and Technology of China, Chengdu, China, ²Advanced Wireless & Communication Research Center, The University of Electro-Communication, Tokyo, Japan

Joint RF Pre-distortion and Post-distortion Linearization of Small Cell Power Amplifiers

Y. Hu, S. Boumaiza, University of Waterloo, Waterloo, Ontario, Canada

Wideband Digital Predistortion with Sub-Nyquist Nonuniform Sampling and Reconstruction of Feedback Path

T. Gotthans, R. Mar's alek, J. Gotthans, University of Technology, Technicka, Brno, Czech Republic

Auxiliary Power Tracking Technique for Linearity Improvement of 10 W GaN HEMT PA with and without Power Gate Tracking

D. Gecan¹, M. Olavsbråten¹, K. M. Gjertsen², ¹Norwegian University of Science and Technology (NTNU), Trondheim, Norway, ²Disruptive Technologies Research, Bergen, Norway

Using a Cascade of Digital and Analog Predistortion to Linearize a Dual-Band RF Transmitter

R. Neil Braithwaite, Consultant, Orange, United States

New Compact Doherty Power Amplifier Design for Handset Applications

K. Takenaka, T. Sato, H. Matsumoto, M. Kawashima, N. Nakajima, M. Manufacturing Co., Ltd., N-shi, Kyoto, Japan

Optimized Output Baluns for Wide-band Differential Class D PAs

M. Kamper¹, G. Fischer², ¹Fraunhofer Institute for Integrated Circuits IIS, Erlangen, Germany, ²University of Erlangen-Nuremberg, Erlangen, Germany

GaN-on-Si Switched Mode RF Power Amplifiers for Non-Constant Envelope Signals

S. Shukla, J. Kitchen, Power One IC, Arizona State University, Tempe, United States

K-band GaN Power Amplifier Design With a Harmonic Suppression Power Combiner

M. A. Reece, S. Contee, C. W. Waiyaki, Morgan State University, Baltimore, United States

A reliable experimental procedure for Volterra parameter identification in wireless systems

Carlos Crespo-Cadenas, Javier Reina-Tosina, Mar'ia J. Madero-Ayora, Escuela Tecnica Superior de Ingenieria, University of Seville, Sevilla, Spain

A GaN Power Amplifier for 100 VDC Bus in GPS L-band

G. Formicone¹, J. Burger¹, J. Custer¹, W. Veitschegger¹, G. Bosi², A. Raffo², G. Vannini², ¹Integra Technologies, Inc., El Segundo, United States, ²University of Ferrara, Ferrara, Italy

Mitigation of Resonance in RF High Power Amplifier enclosure

S. Theepak, V. S. Namburi, B. Devadas, R. Selvapiya, Centre for Development of Telematics, Bangalore, India

0.1mm² SiGe BiCMOS RX / TX Channel Front-Ends for 120 GHz Phased Array Radar Systems

C. Wipf, R. Sorge, J. Schmidt, E. Öztürk¹, H. J. Ng², W. Winkler¹, D. Kissinger^{2,3}, ¹Silicon Radar GmbH, Frankfurt (Oder), Germany, ²IHP, Im Technologiepark, Frankfurt (Oder), Germany, ³Technische Universität Berlin, Berlin, Germany

A 38 GHz Low-Loss Reflection-Type Phase Shifter

L. Huang, Y. Lin, C. Kuo, National Chiao Tung University, Hsinchu, Taiwan

1W < 0.9dB IL DC-20GHz T/R Switch Design with 45nm SOI Process

C. Li¹, G. Freeman¹, M. Boenke¹, N. Cahoon¹, U. Kodak², G. Rebeiz², ¹Global Foundries, United States, ²UC San Diego, United States

A G Band +2 dBm Balanced Frequency Doubler in 55 nm SiGe BiCMOS

W. Aouimeur^{1,4}, J. Moron-Guerra², A. Serhan³, S. Lepilliet⁴, T. Quemerais⁵, D. Gloria⁶, E. Lauga-Larroze¹, J.-D. Arnould¹, C. Gaquière⁴, ¹Univ. Grenoble Alpes, Grenoble, France, ²ASYGN, Montbonnot-Saint-Martin, France, ³CEA-Leti, Grenoble, France, ⁴IEMN, Univ. des Sciences et Technologies de Lille, Villeneuve d'Ascq, France, ⁵ST Microelectronics Crolles, Crolles, France

A 180-GHz CMOS Down-converter MMIC for Atmospheric Remote Sensing Applications

D. Parveg¹, M. Varonen¹, A. Safaripour², S. Bowers^{2,3}, T. Tikka¹, P. Kangaslahti⁴, T. Gaier⁴, A. Hajimiri⁵, K. A. I. Halonen¹, ¹Aalto University, Espoo, Finland, ²California Institute of Technology, Pasadena, United States, ³University of Virginia, United States, ⁴Jet Propulsion Laboratory, California Institute of Technology, Pasadena, United States

A 10-GS/s Track-and-Hold Circuit for a 7-bit Square Kilometre Array ADC in 65-nm CMOS

G. Wu, E. Zailer, L. Belostotski, J. W. Haslett, R. Plume, University of Calgary, Calgary, Canada

High-Performance Elliptic Dual Balun for W-Band CMOS Transceiver

Y. Lin, Y. Lin, K. Lan, M. Kao, C. Chen, C. Wang, National Chi Nan University, Puli, Taiwan

Ultra Sub-wavelength Gigahertz Resonator for Constructing Silicon-substrate Metamaterials

C. Cao¹, D. Ye¹, J. Hangfu¹, S. Qiao², C. Li³, L. Ran¹, ¹Laboratory of Applied Research on Electromagnetics (ARE), Zhejiang University, Hangzhou, China, ²Zhejiang University City College, Hangzhou, China, ³Texas Tech University, United States

Flexible Si BiCMOS on Plastic Substrates

J. Seo¹, K. Zhang¹, W. Zhou², Z. Ma¹, ¹University of Wisconsin-Madison, Madison, United States, ²University of Texas at Arlington, Arlington, United States

60V P- and NMOS Transistors and Schottky Diodes Compatible with SiGe BiCMOS and Sub-22nm CMOS Technology without Drain Current Degradation and Heating Effects at Higher Voltages for Mixed-Signal VLSI Applications

J. Pan, D. Lawson, R. Prematta, T. Shutt, S. Suko, T. Knight, Advanced Technology Laboratory (ATL), Northrop Grumman Corporation Linthicum, United States



Presenters and conference attendees discuss their most recent findings at the RWW2016 Interactive Poster Session
 (Courtesy of LylePhotos, Atlanta)

RWS Session: TU4A

Bio Medical Wireless

RWS Session: TU4B

Passive Components

SiRF Session: TU4C

Efficient RF Power Generation

TWIoS Session: TU4D

TWIoS Invited Talks

15:40

TU4A-1 A Low-Power 190-255 GHz Frequency Quadrupler in SiGe BiCMOS Technology for On-chip Spectroscopic Applications

F. I. Jamal¹, M. H. Eissa¹, J. Borngraber¹, H. J. Ng¹, D. Kissinger^{1,2}, J. Wessel¹, ¹IHP, Im Technologiepark, Frankfurt (Oder), Germany, ²Technische Universität Berlin, Einsteinufer, Berlin, Germany

TU4B-1 A Cochlea-Based C-Band RF Channelizer

J. C. S. Cheih, J. Rowland, T. Xie, J. Rockway, SPAWAR Systems Center Pacific, San Diego, California, United States

TU4C-1 RF Power Generation Using Digitally-Tuned CMOS Technologies (Invited)

J. Kitchen, Arizona State University, Tempe, United States

TU4D-1 The Internet of Space: New Satellite Communication Systems, Technologies and Production Strategies (Invited)

I. Wolff, IMST GmbH, Kamp-Lintfort, Germany

14:00

TU4A-2 Hand Gesture Recognition Based on Wi-Fi Chipsets

T. Fan¹, D. Ye¹, J. Hangfu¹, Y. Sun², C. Li³, L. Ran¹, ¹Laboratory of Applied Research on Electromagnetics, Zhejiang University, Hangzhou, China, ²Nanjing Institute of Electronic Equipment, Nanjing, China, ³Department of Electrical and Computer Engineering, Texas Tech University, United States

TU4B-2 Low-loss RF Filter through a Combination of Additive Manufacturing and Thin-film Process

L. Hernandez¹, A. Kaur², Y. He², J. Papapolymerou², P. Chaha², ¹University of California Riverside, Riverside, United States, ²Michigan State University, E. Lansing, United States

TU4C-2 A 28-nm CMOS 76–81-GHz Power Amplifier for Automotive Radar Applications

N. Rohani, J. Zhang, J. Lee, J. Bai, NXP Semiconductors, Tempe, United States

TU4D-2 The Role of Geostationary (GEO) Space Based Networks (Invited)

R. K. Gupta, Ligado Networks, Reston, United States

16:20

TU4A-3 A 10 Gb/s Highly-Integrated Adaptive Pseudo-Noise Transmitter for Biomedical Applications

C. Schmidt¹, J. Nehring¹, M. Dietz¹, R. Weigel¹, D. Kissinger^{2,3}, A. Hagelau¹, ¹FAU Erlangen-Nürnberg, Erlangen, Germany, ²Technische Universität Berlin, Berlin, Germany, ³IHP, Frankfurt (Oder), Germany

TU4B-3 Dielectric powder loaded coaxial-cavity filters

S. Bulja, F. Pivitt, E. Doumanis, Transceiver Devices, Dublin, Ireland

TU4C-3 A 20-30 GHz High Efficiency Power Amplifier IC with an Adaptive Bias Circuit in 130-nm SiGe BiCMOS

C. Chen¹, X. Xu¹, X. Yang¹, T. Sugiura², T. Yoshimasu¹, ¹Waseda University, Kitakyushu-city, Japan, ²Samsung R&D Institute, Yokohama, Japan

TU4D-3 IEEE Future Directions Committee (FDC) on Internet of Space (Invited)

16:40

TU4A-4 Through-wall Detection of Human Breathing Rate Using Compressive Sensing Technique

S. Nahar¹, L. Ren¹, N. Tran², O. Kilic², Aly E. Fathy¹, ¹The University of Tennessee, Knoxville, United States, ²The Catholic University of America, Washington, DC, United States

TU4B-4 Investigation of Surface Roughness Effects for Dband SIW Transmission Lines on LCP Substrate

S. Li¹, M. Yi¹, S. Pavlidis¹, H. Yu¹, M. Swaminathan¹, J. Papapolymerou², ¹Georgia Institute of Technology, Atlanta, United States, ²Michigan State University, East Lansing, United States

TU4C-4 A 28-nm CMOS 40-GHz High-Resolution Digitally Controlled Oscillator for Automotive Radar Applications

J. Bai, J. Lee, J. Zhang, N. Rohani, NXP Semiconductors, Tempe, United States

TU4D-4

17:00

TU4A-5 3D Stacked Embedded Component System-in-Package for Wearable Electronic Devices

V. Nair, L. Krishnamurthy, J. Swan, A. Essaian, T. Frank, M. Bynum, Intel Corporation, Chandler, United States

TU4B-5 A Substrate-Integrated-Waveguide Dual-Band Bandpass Filter Based on Signal-Interference Principles

J. Munoz-Ferreras¹, D. Psychogiou², R. Gomez-Garcia¹, D. Peroulis², ¹Univ. Alcalá, Alcalá de Henares, Spain, ²Purdue Univ., West Lafayette, United States

TU4C-5

TU4D-5



RWS Session: WE1A
Passives II

WiSNet Session: WE1B
Wireless sensors for Communication, Radar, Positioning & Imaging Applications

SiRF Session: WE1C
Technology, Devices & Modeling

TWIoS Session: WE1D
New Space and Commercial Space

08:00

WE1A-1 A Dual-Layer FSS-Based Corner Reflector for Radiation Divergency of a Monopole Antenna
A. Chatterjee, S.K. Parui, Indian Institute of Engineering Science & Technology, West Bengal, India

WE1B-1 Future Proof IoT (Invited)
T. Abels, Intel Corporation, Hillsboro, United States

WE1C-1 Experimental Verification of TCAD simulation for high-performance SiGe HBTs
J. Korn, H. Rucker, B. Heinemann, IHP, Frankfurt, Germany

WE1D-1 Low Cost Ka-Band Transmitter for CubeSat Systems
K. Potter, Y.H. Shu, M. McNicholas, J. DeLuna, SAGE Millimeter, Torrance, United States

08:20

WE1A-2 An Antenna Having Wide Radiation Pattern but Narrow Beam in Operation Based on Monopulse System for Security Gate Applications at UHF Band
K. Aoki, T. Sakogawa, F. Krokki, National Institute of Technology, Kure College, Hiroshima, Japan

WE1B-2 Doppler-Radar-Based Short-Range Acquisitions of Time-Frequency Signatures from an Industrial-Type Wind Turbine
J.M. Munoz-Ferreras¹, Z. Peng², Y. Tang², R. Gomez-Garcia¹, C. Li¹, ¹Universidad Alcala, Alcala de Henares, Spain, ²Texas Tech University, Lubbock, United States

WE1C-2 A Novel RF Low Noise Amplifier Device in 130nm High Resistivity RFSOI Technology Platform
S. Parthasarathy, X.S. Loo, J.S. Wong, T. Sun, R.T. Toh, S. Zhang, K.W. Chew, P.R. Verma, GlobalFoundries, Singapore, Singapore

8:20

WE1D-2 Ka-band Up-Link CMOS/GaAs Power Amplifier Design for Satellite-based Wireless Sensor
H. Alsuraistry¹, S.T. Yen², J.H. Tsai³, T.W. Huang², ¹King Abdulaziz City for Science and Technology, Riyadh, Kingdom of Saudi Arabia, ²National Taiwan University, Taipei, Taiwan, ³National Taiwan Normal University, Taipei, Taiwan

08:40

WE1A-3 A Polarization-Reconfigurable Microstrip Antenna Design Based on Parasitic Pin Loading
H. Begum¹, X. Wang¹, M. Lu², ¹Nanjing University of Aeronautics and Astronautics, Jiangsu, China, ²West Virginia Institute of Technology, Montgomery, United States

WE1B-3 A Frequency-Multiplexed Doppler-plus-FMCW Hybrid Radar Architecture: Theory and Simulations
J.M. Munoz-Ferreras¹, Z. Peng², R. Gomez-Garcia¹, C. Li¹, ¹Universidad Alcala, Alcala de Henares, Spain, ²Texas Tech University, Lubbock, United States

WE1C-3 A D-Band Tuner for In-situ Noise and Power Characterization in BiCMOS 55 nm
S. Bouyot^{1,2}, A. Bossuet^{1,2,3}, T. Quemerais², G. Ducournau¹, F. Danneville¹, E. Lauga-Larrose³, D. Gloria, J.M. Fournier², C. Gaquiere¹, ¹IEMN, Villeneuve-d'Ascq, France, ²STMicroelectronics, Crolles, France, ³IMEP-LAHC, Grenoble, France

WE1D-3 E-Band Downlink Wireless Data Transmission for Future Satellite Communication
P. Harati¹, E. Rosello¹, I. Dan¹, E.R. Bammididi¹, J. Eisenbeis², A. Tessmann³, D. Schwantuschke³, R. Henneberger⁴, I. Kallfass¹, ¹Univ. of Stuttgart, Stuttgart, Germany, ²Karlsruhe Inst. of Technology, Karlsruhe, Germany, ³Fraunhofer Inst. for Applied Solid States Physics, Freiburg, Germany, ⁴Radiometer Physics GmbH, Meckenheim, Germany

09:00

WE1A-4 A 6-18GHz Wideband SIW H-Plane Dual-Ridged End-Fire Antenna
J. Li, Y. Huang, R. Wang, Y. Wang, G. Wen, University of Electronic Science and Technology of China, Sichuan, China

WE1B-4 Target Evaluation for High Accuracy 80 GHz FMCW Radar Distance Measurements
S. Scherr¹, R. Afroz¹, S. Ayhan¹, S. Thomas², T. Jaeschke³, M. Pauli¹, N. Pohl², T. Zwick¹, ¹Institute of Radio Frequency Engineering and Electronics, KIT, Germany, ²Fraunhofer-Institut für Hochfrequenzphysik und Radartechnik, Wachtberg, Germany, ³Institute of Integrated Systems, RUB, Germany

WE1C-4 Modeling of SiGe HBTs with (ft, fmax) of (340, 560) GHz Based on Physics-based Scalable Model Parameter Extraction
A. Pawlak¹, M. Schroter^{1,2}, ¹Technische Universität Dresden, Dresden, Germany, ²UC San Diego, La Jolla, United States

WE1D-4 Dual Band Wireless Power and Data Transfer for Space-Based Sensors
D. Belo, R. Correia, F. Pereira, N. Borges de Carvalho, Universidade de Aveiro, Aveiro, Portugal

09:20

WE1B-4 Target Evaluation for High Accuracy 80 GHz FMCW Radar Distance Measurements
S. Scherr¹, R. Afroz¹, S. Ayhan¹, S. Thomas², T. Jaeschke³, M. Pauli¹, N. Pohl², T. Zwick¹, ¹Institute of Radio Frequency Engineering and Electronics, KIT, Germany, ²Fraunhofer-Institut für Hochfrequenzphysik und Radartechnik, Wachtberg, Germany, ³Institute of Integrated Systems, RUB, Germany

WE1C-5 A D-Band Passive Receiver with 10 dB Noise Figure for In-situ Noise Characterization in BiCMOS 55nm
S. Bouyot^{1,2}, T. Quemerais², J.C. Azevedo Goncalves^{1,2}, S. Lepilliet¹, G. Docoumau¹, F. Danneville¹, D. Gloria², ¹IEMN, Villeneuve-d'Ascq, France, ²STMicroelectronics, Crolles, France

WE1D-5 System Latency Performance of Mechanical and Electronic Scanned Antennas for LEO Ground Stations for IoT and Internet Access
R. Sturdivant¹, E.K.P. Chong², ¹Micro-wave Products and Technology, Inc., Fullerton, United States, ²Colorado State University, Fort Collins, United States

RWW Session: WE2A

Wireless Architecture & Modeling

WiSNet Session: WE2B

Six-Port & Multi-Port Technology

RWS-SiRF Joint Session: WE2C

Advanced Wireless Transceiver

10:10

WE2A-1 Measurement-based Channel Modeling for mmWave Wireless Links in Enclosed Server Platforms

G. Wang¹, K. Zhan¹, T. Kamgaing², R. Khanna², H. Liu¹, A. Natarajan¹, ¹Oregon State University, Corvallis, United States, Intel Corporation, Hillsboro, ²United States

WE2B-1 Non-uniform Coupler Based 2-20 GHz Six-Port Reflectometer

T. Lin, S. Gu, T. Lasri, Universite Lille, Villeveuve d'Ascq Cedex, France

WE2C-1 Fully-Integrated Non-Magnetic Non-Reciprocal Components Based on Linear Periodically-Time-Varying Circuits (Invited)

N. Reiskarimian, H. Krishnaswamy, Columbia University, New York, United States

10:30

WE2A-2 A Direct RF-to-Baseband Quadrature Subsampling Receiver Using a Low Cost ADC

M. Haberl, B. Sanftl, M. Trautmann, R. Weigel, A. Koelpin, University of Erlangen-Nuremberg, Erlangen, Germany

WE2B-2 Detector Nonlinearity in Six-Port Radar

S. Linz, C. Will, F. Lurz, S. Lindner, S. Mann, R. Weigel, A. Koelpin, University of Erlangen-Nuremberg, Erlangen, Germany

10:50

WE2A-3 Radar Waveform Optimization for Ambiguity Function Properties and Dynamic Spectral Mask Requirements Based on Communication Receiver Locations

C. Latham¹, M. Fellows¹, C. Bayliss¹, L. Cohen², R.J. Marks II¹, ¹Baylor University, Waco, United States, ²Naval Research Laboratory, Washington D.C., United States

WE2B-3 Segmental Polynomial Approximation based Phase Error Correction for Precise Near Field Displacement Measurements using Six-Port Microwave Interferometers

C. Will, S. Linz, S. Mann, F. Lurz, S. Lindner, R. Weigel, A. Koelpin, University of Erlangen-Nuremberg, Erlangen, Germany

WE2C-2 A 15GHz 4-Channel Transmit/Receive RF Core-Chip for High SHF Wide-band Massive MIMO in 5G

K. Tsutsumi, W. Yamamoto, T. Maruyama, T. Fujiwara, I. Somada, T. Hagiwara, E. Taniguchi, M. Shimozawa, Mitsubishi Electric Corporation, Kanagawa, Japan

11:10

WE2A-4 Performance of Adaptive Movable Access Point System in the Presence of Positioning Error

S. Oka¹, T. Murakami², Y. Takatori², M. Mizoguchi², F. Maehara¹, ¹Waseda University, Shinjuku, Japan, ²Nippon Telegraph and Telephone Corporation, Tokyo, Japan

WE2B-4 Six-Port Reflectometer With Tunable Parameters Ensuring Measurement Accuracy Enhancement

K. Staszek, J. Sorocki, K. Wincza, S. Gruszczynski, AGH University of Science and Technology, Krakow, Poland

WE2C-3 A Low Power Programmable Dual-Slope ADC for Single-Chip RFID Sensor Nodes

H. Shan, S. Rausch, A. Jou, N.J. Conrad, S. Mohammadi, Purdue University, West Lafayette, United States

11:30

WE2A-5 Cyclic Mapping Method for Digital Color Shift Keying with RGB-LED Array

Y. Matsuda, Y. Kozawa, Y. Umeda, Tokyo University of Science, Chiba, Japan

WE2B-5 An Improved-Performance V-band Six-Port Receiver for Future 5G Short-Range Wireless Communications

C. Hannachi, E. Moldova, S.O. Tatu, Institut National de la Recherche Scientifique, Montreal, Canada

WE2C-4 Programmable-Gain Constant-IF-Bandwidth SiGe BiCMOS Upconversion Micromixer at 2.4/5.8 GHz Using Current-Mode Approach

J.S. Syu¹, W.L. Chang¹, C. Meng¹, Y.C. Lin¹, G.W. Huang², ¹National Chiao Tung University, Hsinchu City, Taiwan, ²National Nano Device Laboratories, Hsinchu, Taiwan

WE3P: Joint RWW Interactive Poster Session
13:30-15:30

A Low-Cost, Dual-Band RF Loop Antenna and Energy Harvester
A. Azam, Z. Bai, J.S. Walling, University of Utah, Salt Lake City, United States

Target Localization using Multi-static UWB Sensor for Indoor Monitoring System
R. Nakamura, H. Hadama, National Defense Academy of Japan, Kanagawa, Japan

Novel Concept of RF Hardware for Remote Sensing Technologies
V. Nesterov, Dr. D. Fedotov, Dr. H. Kim, S1 Samsung R&D Center, Moscow, Russian Federation

Full-Duplex Backscatter System Using a Bluetooth Low Energy (BLE) Receiver
J.F. Ensworth¹, A.T. Hoang¹, T.Q. Phu¹, M.S. Reynolds^{1,2}, ¹Department of Electrical Engineering University of Washington, Seattle, United States, ²Department of Computer Science and Engineering, University of Washington, Seattle, United States

Autonomous Learning Approach to Characterizing Motion Behavior
A. Haswary¹, R. Anil², H. Khanna², A.S. Keshavamurthy¹, R. Khanna¹, ¹Intel Corporation, Hillsboro, United States

Distributed Estimation of a Parametric Field under Energy Constraint
M. Alkhweldi, West Virginia University, Morgantown, United States

A Novel Spectrum Hole Compensation using Khatri-Rao Product Array Processing on Random Stepped FM Radar
K. Jimi, I. Matsunami, The University of Kitakyushu, Fukuoka, Japan

A Low Power 4-GHz DCO with Fine Resolution and Wide Tuning Range in 22 nm FDSOI CMOS Technology
C. Zhang, M. Otto, GlobalFoundries, Austin, United States, GlobalFoundries, Dresden, Germany

On the Dependence of FET Noise Model Parameters on Ambient Temperature
M.W. Pospieszalski, National Radio Astronomy Observatory (facility of the National Science Foundation), Charlottesville, United States

A 90~96 GHz CMOS Down-Conversion Mixer with High Conversion Gain and Excellent LO-RF Isolation
Y.S. Lin, K.S. Lan, Y.W. Lin, H.R. Pan, C.C. Chen, C.C. Wang, National Chi Nan University, Puli, Taiwan, ROC

Constrained Identification of Rational Functions for Robust Digital Predistortion
A. Islam, P.J. Xia, H. Huang, S. Boumaiza, University of Waterloo, Waterloo, Canada

Wireless Device Classification Through Transmitter Imperfections - Evaluation of Performance Degradation Due to the Chip Heating
M. Pospisil, R. Marsalek, T. Gotthans, Brno University of Technology, Brno, Czech Republic

Design and Experimental Validation of a Simple Antenna De-embedding Approach for mmWave Channel Modeling
S.T. Lu¹, R. Zhang², C. Cao¹, X. Zou¹, ¹Communications Technologies Laboratory, Huawei Technologies Co. Ltd. Chengdu, China, ²Communications Engineering Department, Northwestern Polytechnical University, Xi'an, China

Electro-Textile Slotted Patch Antenna for Wearable Passive UHF RFID Tags
A. Liu¹, Z. Wei¹, X. Chen², L. Ukkonen², J. Virkki², T. Bjorninen², ¹City University of Hong Kong, Kowloon, Hong Kong, ²Tampere University of Technology, Tampere, Finland

A 3.1 to 4.6 GHz 3-bit Reconfigurable Bandpass Filter Using N/4 Microstrip Resonators and Chip Inductor Coupling
Y. Kada, Y. Yamao, Advanced Wireless & Communication Research Center, University of Electro-Communications, Tokyo, Japan

Rat-Race Directional Couplers Operating in Differential Mode
I. Piekarz, J. Sorocki, K. Wincza, S. Gruszczynski, AGH University of Science and Technology, Krakow, Poland

Low Insertion Loss 60 GHz CMOS H-shaped Resonator BPF
A. Barakat^{1,3}, N. Mahmoud², R.K. Pokharel¹, ¹Kyushu University, Fukuoka, Japan, ²Tanta University, Tanta, Egypt, ³Electronics Research Institute, Giza, Egypt

Four-Tap RF Canceller Evaluation for Indoor In-Band Full-Duplex Wireless Operation
K.E. Kolodziej, B.T. Perry, MIT Lincoln Laboratory, Lexington, United States

MRI RF Pulse Spectral Regrowth Contributions by PIN Diodes
R.H. Caverly, Villanova University, Villanova, United States

Dielectric Notch Radiator Antennas with Integrated Filtering For 5G and IoT Access
R. Sturdivant¹, E.K.P. Chong², ¹MPT, Fullerton, United States, ²Colorado State University, Fort Collins, United States

Co-Design of an Antenna-Power Amplifier RF Front-End Block without Matching Network for 2.4 GHz WiFi Application
A. Pal¹, H. Zhou¹, A. Mehta¹, E. Nagasundaram², J. Lees², D. Mirshekar-Syahkal³, ¹Swansea University, Swansea, Wales, United Kingdom, ²Cardiff University, Cardiff, Wales, United Kingdom, ³Essex University, Colchester, United Kingdom

Comparison of Wearable Passive UHF RFID Tags based on Electro-Textile Dipole and Patch Antennas in Body-Worn Configurations
Z. Wei¹, A. Liu¹, X. Chen², B. Waris², L. Ukkonen², T. Bjorninen², J. Virkki², ¹City University of Hong Kong, Kowloon, Hong Kong, ²Tampere University of Technology, Tampere, Finland



(Courtesy of LylePhotos, Atlanta)

RWS Session: WE4A

SDR & Cognitive Radio

WiSNET Session: WE4B

Sensors for IoT Applications

15:40

WE4A-1 SDR Implementation of an Adaptive Low-Latency IEEE 802.11p Transmitter System for Real-Time Wireless Applications

M. Kloc, R. Weigel, A. Koelpin, University of Erlangen-Nuremberg, Erlangen, Germany

WE4B-1 Throughput Improvement by Cluster-Based Multihop Wireless Networks with Energy Harvesting Relays

V. Singh, H. Ochiai, Yokohama National University, Kanagawa, Japan

16:00

WE4A-2 Novel Baseband Equivalent Models of Quadrature Modulated All-Digital Transmitters

O. Tanovic^{1,2}, R. Ma¹, K.H. Teo¹, ¹Mitsubishi Electric Research Laboratories, Cambridge, United States, ²Massachusetts Institute of Technology, Cambridge, United States

WE4B-2 Performance Analysis of a Ultra-Compact Low-Power Rectenna in Paper Substrate for RF Energy Harvesting

V. Palazzi¹, C. Kallialakis², F. Alimenti¹, P. Mezzanotte¹, L. Roselli¹, A. Collado³, A. Georgiadis³, ¹University of Perugia, Perugia, Italy, ²Centre Tecnologic de Telecomunicacions de Catalunya, Castelldefels, Spain, ³Heriot-Watt University, Edinburgh, United Kingdom

16:20

WE4A-3 Real-Time Amplifier Optimization Algorithm for Adaptive Radio Using a Tunable-Varactor Matching Network

Z. Hays¹, C. Kappelmann¹, S. Rezayat¹, M. Fellows¹, L. Lamers¹, M. Flachsbart¹, J. Barlow¹, C. Baylis¹, E. Viveiros², A. Darwish², A. Hedden², J. Penn², R.J. Marks II¹, ¹Baylor University, Waco, United States, ²Army Research Laboratory, Adelphi, United States

WE4B-3 RSSI-Based Localization With Minimal Infrastructure Using Multivariate Statistic Techniques

F. Pflaum, S. Erhardt, R. Weigel, A. Koelpin, Friedrich-Alexander-University of Erlangen-Nuremberg, Erlangen, Germany

16:40

WE4A-A Modulation Classification Method in Cognitive Radios System using Stacked Denoising Sparse Autoencoder

X. Zhu, T. Fujii, Advanced Wireless and Communication Research Center, The University of Electro-Communications, Tokyo, Japan

WE4B-4 A Simple CoMP Transmission Method Employing Vehicle Position Information for Taxi Radio Systems

N. Kurihara, K. Ujihara, F. Maehara, Waseda University, Tokyo, Japan

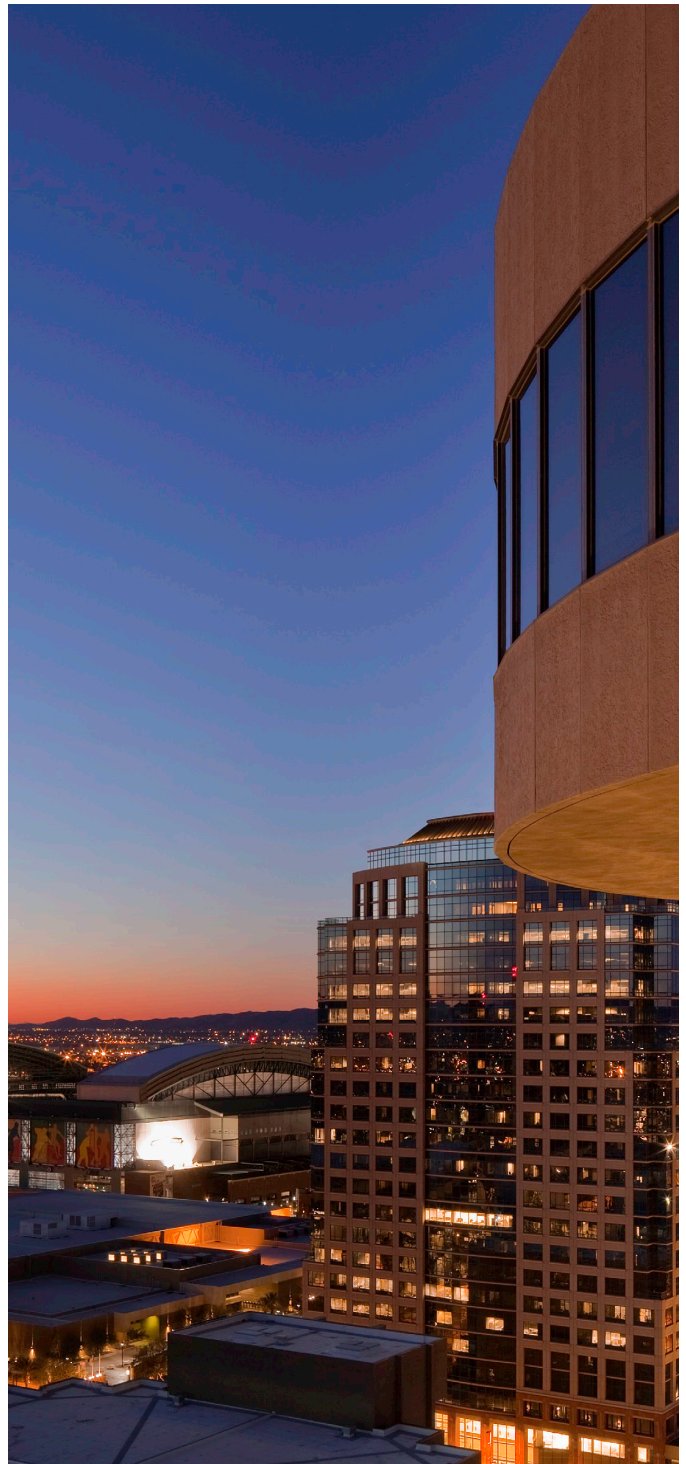
17:00

WE4A-B Real-Time Amplifier Optimization Algorithm for Adaptive Radio Using a Tunable-Varactor Matching Network

Z. Hays¹, C. Kappelmann¹, S. Rezayat¹, M. Fellows¹, L. Lamers¹, M. Flachsbart¹, J. Barlow¹, C. Baylis¹, E. Viveiros², A. Darwish², A. Hedden², J. Penn², R.J. Marks II¹, ¹Baylor University, Waco, United States, ²Army Research Laboratory, Adelphi, United States

WE4B-4 A Simple CoMP Transmission Method Employing Vehicle Position Information for Taxi Radio Systems

N. Kurihara, K. Ujihara, F. Maehara, Waseda University, Tokyo, Japan



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