2017 IEEE Radio & Wireless Week

FINAL PROGRAM

Phoenix, Arizona USA
Hyatt Regency
15-18 January, 2017

RWW & RWS
General Chair:
Jeremy Muldavin,
MIT Lincoln Laboratory

RWW & RWS
General Co-Chair:
Rashaunda Henderson,
University of Texas at Dallas

RWS, PAWR, WiSNet, TWIoS Technical Program Co-Chair:
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Nanosemi Inc.

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University of Innsbruck

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Alexander Koelpin,
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2017 Radio & Wireless Week Sponsor:
IEEE Microwave Theory and Techniques Society (MTT-S)

http://www.radiowirelessweek.org
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, Wireless-Apps 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

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

RWS 2017 Technical Program Committee

3D & Novel Engineered Materials
Chair: Benjamin Cook
Katherine Duncan
Daniel Revier
Chiara Mariotti

Biological/Medical Wireless Technologies and Sensing Systems
Chair: Katia Grenier
J-C Chiao
Dietmar Kissinger
Mehammad-Reza Tofighi
Seyed Islam
Changzi Li

Emerging Wireless Technologies and Applications
Chair: Debabani Choudhury
Chia-Chan Chang
Zhen Ning Low
Huy Nguyen
Sergio Pacheco
Spyridon Pavlidis

High-speed and Broadband Wireless Technologies
Chair: Kevin Chuang
Danda Rawat
Fangzheng Zhang
Juan Jose Vegas Olmos

MIMO Signal Processing and Smart Antennas
Chair: Jeremy Muldavin
Eiji Okamoto
Rashaunda Henderson
Chau Yuen

Passive Antennas
Chair: Jiang Zhu
Anirad Amadikpe
Goutam Chattopadhy
Ahmed Kishk
Arnaud Fontgalland
James Schaffner
Abbas Semnani
Songnian Yang
You Zou

Passive Components and Packaging
Chair: Roberto Gomez-Garcia
Bayaner Arigong
Dariush Mirshekar
Dimitra Psymologou
Hualiang Zhang

Software Defined Radios and Cognitive Radios
Chair: Abbas Omar
Yves Baeyens
Alessandro Cidronali
Edward Niehenke
Nuno Carvalho
Rui Ma
Otilia Popescu

Terahertz Communications
Chair: Imran Mehdhi
Zeshan Ahmed
Jae-Sung Rieh
Timo Jaeschke

Wireless Systems Architecture and Modeling
Chair: Chenming Zhou
Xinwei Wang
Karl Molnar
Kostas Katsalis
Markos Anastasopoulos
Donald Lie
Shin Hara

Transceivers and Front-End Technologies SOC and SIP
Chair: Erick Djoumessi
Emery Chen
Minoru Fujishima
Telesphor Kamgaing
Hiroshi Okazaki
Nathalie Delhomple
Tzyy-Sheng Jason Hong
Renato Negra
Xin Wang

Invited Papers and Special Session
Kevin Chuang
Jeremy Muldavin
Rashaunda Henderson
Roberto Gomez-Garcia

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Jeremy Muldavin, MIT Lincoln Laboratory

General Co-Chair/Technical Program Chair:
Rashaunda Henderson, University of Texas at Dallas

Technical Program Co-Chair:
Kevin Chuang, NanoSemi, Inc.

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Andrei Grebennikov, Sumitomo Electric Europe
Gayle Collins, Nuvotronics Inc.

Topical Conference WSN Co-Chairs:
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Alexander Koelpin, University of Erlangen-Nuremberg
Luca Roselli, University of Perugia

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Min Hua, Rayasical

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Valcavi Valenta, ESA/ESTEC
Nuno Borges Carvalho, Universidade de Aveiro

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Ahmet Cagri Ulusoy, Michigan State University

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Changzi Li, Texas Tech University
Alexander Koelpin, University of Erlangen-Nuremberg
Jeffrey Pawlin, Pawlin Communications

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Wasif Tanveer Khan, Lahore University of Management Sciences

Aida L. Vera Lopez, IEEE

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Holger Maune, Technical University of Darmstadt

Microwave Magazine Special Issue Editor:
Abbas Semnani, Purdue University

Exhibition/Sponsorship Chair:
Elsie Vega, IEEE

Conference Management:
Elsie Vega, IEEE

Deirdre Zeigler, IEEE

International Liaison:
Zaher Bardai, IEEE

RWW Executive Committee Chair:
Charlie Jackson, Northrop Grumman Corp.

At Large (Avisors):
Takao Inoue, National Instruments
Sergio Pacheco, NXP
Karl Varian, IEEE MTT-S

Skyline of Downtown Phoenix, AZ
**Message from the SiRF General Chair:**

**Welcome to SiRF 2017!**

The IEEE Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems (SiRF) celebrates its 17th year in Phoenix, Arizona, as one of five parallel topical conferences and workshops that make up IEEE Radio and Wireless Week 2017, which will take place 15–18 January 2017.

Phoenix, with its perpetual sunshine and dry weather is the perfect venue for this winter conference event and the perfect choice for SiRF 2017. Be sure to reserve some time to experience the panoramic view of the iconic landmark Camelback Mountain, trailing South Mountain Park and Preserve, and visiting Desert Botanical Garden. Other cultural highlights include the Heard Museum exhibitions on the tradition, culture and history of 22 regional American Indian tribes, the Musical Instrument Museum, as well as great art experiences in Roosevelt Row and Phoenix Art Museum.

**SiRF 2017** continues to be sponsored by the IEEE Microwave Theory and Techniques Society. The history and success of this topical conference is closely linked to the pioneering activities at the forefront of moving silicon technologies such as CMOS and SiGe into the microwave and millimeter-wave application domain. In the early days, many efforts have been spent on RF electromagnetic device modeling and the realization of high-frequency building blocks. This trend further matured resulting in the demonstration of highly-integrated transceiver implementations and complex RF-to-digital silicon systems. Today’s proofs of technological establishment are omnipresent with full system integration of complex high-frequency and low-power silicon solutions at 60 GHz and beyond, which underline the importance and success of the conference. SiRF will continue its tradition as a hub for creative novel work with a renewed emphasis on promoting a dialogue between IC designers and researchers promoting non-standard technologies, exploiting the maturity of silicon processes, but addressing the challenges of tomorrow. The three days of SiRF 2017 will chronicle recent advances in our dynamic field, and provide the platform for developing new ideas, and candid exchange. The conference will once again feature a number of excellent invited speakers to address emerging topics in the various facets of silicon-based RF design and technology challenges and opportunities.

5G wireless standard physical layer design will be one of the key aspects discussed during SiRF 2017. Within this theme, Prof. Tian-Wei Huang from National Taiwn University, Taipei will give an overview on the current status and outlook on millimeter-wave ultra-broadband transceiver design for 5G communication. A similar important topic of full-duplex wireless operation will be addressed by Prof. Harish Krishnaswamy from Columbia University, New York. He will be introducing the idea of fully-integrated CMOS non-reciprocal components for high-isolation and linearity circuit design required for full-duplex architectures.

A large number of additional regular and invited papers in the areas of materials, technologies, devices, circuit, silicon photonics, and applications complement the technical program to make SiRF 2017 an exciting and informative event for you. For the latest information on SiRF 2017, visit us at www.silicon-rf.org.

**Welcome to SiRF 2017!**

Dietmar Kissinger
SiRF 2017 Conference Chair

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**SiRF 2017 Technical Program Committee**

**Technical Program Committee Chairs:**
Nils Pohl, Ruhr-Universität Bochum
Monte Miller, NXP

**Technology, Devices and Modeling**
Chair: Mehmet Kaynak
Julio Costa
Katsuosshi Washio
Paul Hurwitz

Mingta Yang
Guofu Niu
Ratha Chakraborty

**Passives and MEMS**
Chair: Jean-Pierre Raskin
Xun Gong
Hajati Sigmansson
Vikas Shilimkar

Pierre Blondy
Xiaoguang Liu
Florian Herrault

**Circuits**
Chair: Larry Larson
Vincent Fusco
Yunliang Zhu
Kenichi Okada
Laleh Rabierad
Ahmet Cagri Ulusoy
Giang Liu

Lance Kuo
Hsieh-Hung Hsieh
Monte Miller
Rahul Kodkani
Austin Ying-Kuang Chen

**Applications and Wireless Architectures**
Chair: Chien-Nan Kuo
Donald Y.C. Lie
Hasan Sharifi
Himanshu Khair

Jürgen Hasch
Yan Li
Herman Jall Ng

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**REGISTRATION HOURS**

Registration is open during the following times in the Atrium:

- Sunday, 15 January: 13:00-18:00
- Monday, 16 January: 07:00-18:00
- Tuesday, 17 January: 07:00-17:00

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**EXHIBIT HOURS**

The exhibition area in the Atrium is open during the following times:

- Monday, 16 January 13:00 – 17:30
- Tuesday, 17 January 13:30 – 15:10

For the latest information and details on how to become a sponsor and exhibit at RWW please visit: http://www.radiowirelessweek.org/exhibits.
Power Amplifiers for Radio and Wireless Applications (PAWR)

Interest in power amplifier technology remains at an all-time high because of the emergence of new device materials such as GaN that offer improved performance, and the need for ever greater linearity and efficiency by the world’s expanding wireless communication infrastructure. Topical Conference on Power Amplifiers for Wireless and Radio Applications (PAWR) will feature power amplifier focused sessions, including the latest advances on power amplifier technology, efficiency enhancement techniques, system analysis, modeling, distortion reduction, an interactive workshop on Techniques for High Efficiency Linear Power Amplification of 5G Signals and a panel session on Linearization of Power Amplifiers.

Technical Program Committee:
Distortion Reduction Techniques in RF Power Amplifiers
Chair: Slim Boumaiza
Neil Braithwaite
Armando Cova
Allen Katz
Steve Kenney
Jinsung Choi
Kiki Ikossi
Peter Kenington
Joe Staudinger
Jens K. Pedersen

High Efficiency RF Power Amplifiers
Chair: Dave Runton
Steve Cripps
Narendra Kumar
Chao Lu
Frederick Raab
Mury Thian
James Komiaq
Song Lin
Wolfgang Heinrich
Ali Tombak

RF Power Amplifier Technology
Chair: Nick Cheng
Paolo Colantonio
Murat Eron
Gary Hau
Chan-Ho Lee
Zoya Popovic
Nathalie Deltimple
Marc Franco
Bumman Kim
Donald Lie

Power Amplifier Modeling and System Analysis
Chair: Jose Carlos Pedro
Florinel Balteanu
Gayle Collins
Stephen Maas
Francis Rotella
Anding Zhu
Robert Caverly
Ming Ji
Patrick Robin
Almudena Suarez

Wireless Sensors and Sensor Networks (WiSNet)

WiSNet is dedicated to the advancement of wireless sensors for commercial and industrial applications and will be held to specifically focus on the latest developments in these areas of RF Sensors and Sensor Networks. Wireless sensors and sensor networks are critical system components for manufacturing, monitoring, safety, positioning and tracking applications and, more generally, they are key elements in the physical layer of Internet of Things ecosystems. This year, WiSNet2017 will be a full day topical conference focused on the latest developments in these areas including sensors and smart sensor networks ranging from UHF, RFID applications to millimeter-wave radar systems and six-port technology. A special session will focus on sensing technologies and applications specifically devoted to IoT.

Technical Program Committee:
Wireless Sensors for Communication, Radar, Positioning and Imaging Applications
Chair: Martin Vossiek
Aly Fathy
Mario Pauli
Changzhi Li
Kamal Samanta

Wireless Sensors for Localization, Tracking, and RFID Technologies
Chair: Manos M. Tantzeris
Reinhard Feger
Diego Masotti
Hao Xin
Apostolos Georgiadis
Xianming Qing

Wireless Integrated Sensors, Front-Ends, and Building Blocks
Chair: Thomas Ussmueller
Andreas Baenisch
Holger Maune
Nils Pohl
Daniela Dragomirescu
Linus Maurer
Huei Wang

Wireless Sensors for Harsh Environments, Environmental, Home, Health and Commercial Applications
Chair: Alexander Koelpin
Maurizio Bozzi
Georg Fischer
Arne Jacob
Jung-Chih Chiao
Xun Gong
Hendrik Rogier

Sensor Network Communication Architecture and Topologies
Chair: Luca Roselli
Dharmesh Jani
Geoff Koelpin
Six Port and Multi-port Technology
Chair: Alexander Koelpin
Fadhil Ghanouchi
Adriana Serban
Serioza Tatu
Tuanh Linh
Wenda Molina Fernandez
Gabor Vinci

Wireless Sensors for Wearable Computing and Internet of Things
Chair: Nuno Borges Carvalho
Ariadne Haji
Giulia Orecchini
Ana Collado
Alessandra Costanzo
Pesina Crojovic-Bengin
Smail Tedjini

Invited Papers
Chair: Luca Roselli
Alexandra Koelpin
**Technical Program for 2017 Radio & Wireless Week (RWW)**

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

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<th>Workshop</th>
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<td><strong>Inkjet and 3D printed electronics for the Internet of Things and 5G communication systems</strong>&lt;br&gt;Room: Remington</td>
<td><strong>Techniques for High Efficiency Linear Power Amplification of 5G Signals</strong>&lt;br&gt;Room: Russell</td>
<td><strong>High speed Optical Communications and Optoelectrical Component Technologies for 400 Gbit/s and Beyond</strong>&lt;br&gt;Room: Borein AB</td>
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**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 chains in a low cost, rapid, on-demand model and furthermore providing an enabling technology for 5G systems.

**Talks and Speakers:**
- **Introduction to Inkjet and 3D Printed Circuits for Energy Harvesting, Sensing and Communication**
  Apostolos Georgiadis, Heriot-Watt University
- **Advanced Digital Coherent Optical Communications**
  Munehiko Nagatani, NTT Device Technology Laboratories
- **Digital Predistortion Basics, Overview of Methods, Challenges (Front-End Imperfections, Timing Mis-match, etc.), DPD Structures and Identification**
  Geneviève Baudoin, Université Paris-Est, ESIEE Paris
- **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 Systems. This Workshop Will Cover the Key Technologies Supporting the Cutting-edge Optical Transmission Systems, Including High-speed Digital Signal Processing Technology to Optimize 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.

- **Microwave and mm-Wave Applications of 3D Multi-Material Digital Printing for Antennas and Circuit Components**
  Thomas Weller, University of South Florida
- **Advanced Digital Coherent Technology Towards Tera-bit/s/ch Optical Transport Network**
  Noriaki Kaneda, Nokia Bell Labs
- **Digital Predistortion 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.**
  Noriaki Kaneda, Nokia Bell Labs
- **InP-HBT-based Ultra-broadband Circuits for Advanced Digital Coherent Optical Communications Systems**
  Munehiko Nagatani, NTT Device Technology Laboratories
- **Transmitters and Receivers for Optical Links Beyond 100 Gbit/s**
  Manfred B erroth, Universitat Stuttgart
- **Implementation Aspects of Digital Predistortion (Computational Complexity, Stability of Solutions, Multiple Solutions, etc.), Remote Experiments with Digital Predistortion Setup**
  Noriaki Kaneda, Nokia Bell Labs
- **InP-HBT-based Ultra-broadband Circuits for Advanced Digital Coherent Optical Communications Systems**
  Munehiko Nagatani, NTT Device Technology Laboratories
- **PAPR Overview of Post-OFDM Waveforms (FBMC, UFMC, GFDMA, Filtered OFDM, NC-OFDM, etc.) and Strategies to Meet Both Spectrum and Power Efficiencies for 5G Transmitters**
  Yves Louest, CentraleSupélec
- **High Speed Optical Transport Network**
  Fukutaro Hamaoka, NTT Network Innovation Laboratories
- **Digital Signal Processing Technologies**
  Noriaki Kaneda, Nokia Bell Labs
- **InP-HBT-based Ultra-broadband Circuits for Advanced Digital Coherent Optical Communications Systems**
  Munehiko Nagatani, NTT Device Technology Laboratories
- **Transmitters and Receivers for Optical Links Beyond 100 Gbit/s**
  Manfred Berroth, Universität Stuttgart
Things are different in the desert. The sky is bigger. The stars are brighter. The sunsets stop you in your tracks. It's a feeling that can't be conjured, landscaped, or kindled with twinkling bulbs. Film director John Ford knew that. So did architect Frank Lloyd Wright.

Downtown: When the business day ends, the fun begins in downtown Phoenix. This is where—you'll find sports arenas, live music, rooftop lounges, museums, theaters, art galleries, and more than 100 restaurants and bars. Downtown is also home to the Phoenix Convention Center and Arizona State University's downtown campus. And it's all served by one of the newest light rail systems in the nation. CityScape, a two-block concentration of restaurants, bars, and fashion retailers, is home to an urban-chic bowling alley, a dance club and arcade, a live-and-concert venue with 60 beers on tap, and a comedy theater and suppershow with rentable meeting spaces. Pro sports are all around—from baseball at Chase Field, football at the Phoenix Convention Center and Arizona State University, football at the Phoenix Convention Center, and Arizona State University, and basketball at the Veterans Memorial Coliseum, home of the Phoenix Suns—amazingly all within walking distance.

Camelback Mountain: The panoramic view from the ‘hump’ of this iconic landmark, named for its resemblance to a kneeling camel, is worth scaling its two tricky trails. Echo Canyon and Cholla. Hikers gain 1,200 feet in elevation to the summit, which looks out over the city and the Phoenix Mountains Preserve. Camelback is one of the most popular urban hiking spots in the world, so expect high traffic and consider hiking on weekdays. Dogs are only allowed on the Cholla Trail. During hot weather months, hike in the summer morning or near dusk, and drink plenty of water.

Museum Instrumental: Hear, and even play instruments from every corner of the world with this one-of-a-kind collection. The Musical Instrument Museum (MIM) turns you into thousands of instrument sounds with a headset that syncs seamlessly as you move through its galleries. Take a world tour of cultural instruments and pop-cultural artists, and return for a live music experience at the MIM Music Theater, a year round concert series hosting more than 200 international acts.

Desert Botanical Garden: The winding paths of this 50-acre desert garden showcase a fantastic variety of arid plants, from towering saguaros to delicate blooms. This beautiful landscape is also the backdrop for the garden's seasonal events. Music in the Garden, a spring concert series, features a variety of local jazz, blues, and folk performers. On Thursdays and Saturdays throughout the summer months, bring a flashlight for cooler evening exploration along the garden's trails during Flashlight Tours.

Heard Museum: The tradition, culture, and history of 22 regional Native American tribes converge in the Heard Museum’s immersive exhibits and authentic art shop. Through art and cultural objects, the museum’s ongoing exhibits tell the stories of the native peoples of the Southwest, from early history to powerful memoirs of government-run boarding schools. Current rotating exhibits include “Personal Journeys: American Indian Landscapes”, a collection exploring the relationship between native artists and nature.

Roosevelt Row: The creative beat of the city’s urban heart is in Roosevelt Row, home to galleries, murals, splashy business walls, and a monthly art walk. This arts district is a prominent stop for visitors and the downtown community along the First Friday self-guided tour from 6 to 9 p.m. Roosevelt Row also caters to a nocturnal crowd: patrons can keep it lit by shopping during Vampire Hours, when boutiques, restaurants, and galleries stay open until 9 p.m. or later.

South Mountain Park and Preserve: Boasting 50 miles of trails through 16,000 acres of the Sonoran Desert, this municipal park is perfectly suited for outdoor adventure just minutes from the city. The skyline views and the Sonoran Desert flora aren’t the park’s only attractions: keep a lookout for ancient petroglyphs carved into the rocks. If you’d rather drive than bike, hike, or hoof it up the trails, hop on the 5.5-mile Summit Road up to Dobbins Lookout, the highest accessible point in the preserve.

Phoenix Art Museum: The Southwest’s largest fine-art museum features a collection of contempor ary work and global masterpieces. Complementing the museum’s treasures of fine art and objects from Asia, America, Europe, and beyond are rotating exhibitions such as WATER by Edward Burtynsky. Want to see the permanent collections for free (and the special exhibitions at a discount?) Visit Wednesdays from 3 to 9 p.m. during voluntary donation time or the second Sunday of the month from noon to 5 p.m. for Family Sunday activities.
Plenary Session

5G on the Road to WRC-19

Time: 10:10 - 11:50
Room: Regency Ballroom A/B

Abstract: RW2017 highlights the recent hardware and system solutions that will help facilitate the upcoming deployment of 5G. Significant progress is being made on the road to 5G via research and development, the creation of new standards, network trials, and product designs. Two major efforts are currently underway in the International Telecommunication Union – Radiocommunication Sector (ITU-R). First, ITU-R Working Party 5D is undertaking a wide range of tasks culminating in the development of the specification(s) for IMT-2020. The second major effort revolves around spectrum access. Demand for mobile broadband spectrum continues to grow due to an increasing number of users (~3.6 billion mobile broadband subscriptions in 2016) and more bandwidth-intensive traffic such as video. Join us for a discussion on key milestones on the 5G road to WRC-19.

Jayne Stancavage
Executive Director of Communications Policy
Intel Corporation

Jayne leads Intel’s as well as the International Telecommunications Union/World Radiocommunication Conferences. She joined Intel in 2000, focusing on communications policy. She has previously led Intel’s spectrum policy efforts supporting Wi-Fi and WiMAX technologies. In addition to her policy work, she has also worked within Intel business units where she coordinated Intel’s internal efforts to embed Wi-Fi capabilities into notebook platforms. Jayne served multiple terms on the Wi-Fi Alliance Board of Directors. Jayne currently chairs the Terrestrial Services group (IWG-2) within the FCC’s WRC-19 Advisory Committee. She has also been a voting member of the IEEE 802.18 Radio Regulations Technical Advisory Group, the Wi-Fi Alliance Regulatory Committee and Chair of the WiMAX Forum Regulatory Working Group. Jayne received both her bachelor’s and master’s degrees in Political Science from the Massachusetts Institute of Technology.

Demo Track Presentations

Time: 13:30 - 15:15
Room: Atrium

In its sixth year of RWW, there will be a demo session where presenters bring in demonstrations of their latest wireless experiments for a hands-on interactive forum. Come, see and feel how people are tackling real-world problems to address the next wireless innovation!

1. Real Time Ethernet Data Link for Inductive Power Transfer Systems
B. Sanftl, T. Magel, M. Trautmann, R. Weigel, A. Kölpin
Friedrich-Alexander University Erlangen-Nuremberg, Erlangen, Germany

We show the first fully functional data link for inductive power transfer (IPT) systems. The used IPT System would work at a switching frequency of 150 kHz with a power transfer of 20W. The jointly used data link features a net transfer rate of up to 6 kbit/s with a bit error rate smaller $10^{-9}$. These figures point to a very robust data link, predicting possible data rates of up to 500 kbit/s. To make the whole system ready for industry 4.0 applications, we extend it with an 802.3 Ethernet interface. Thus, it can be used to control sensors or actuators over the IPT link. Possible applications include e.g. robotic systems, electric vehicle charging, roulette tables, (underwater) unmanned vehicles and electric engines.

A. Orth1, T. Jaeschke1, S. Kueppers2, N. Pohl1
1Ruhr-University Bochum, Bochum, Germany, 2Fraunhofer FHR, Wachtberg, Germany

We present an implementation of a high precision frequency modulated continuous wave (FMCW) radar signal processing concept capable of handling real-time applications. As a demonstration the processing is performed on a levitating sphere control loop system. An ultra-wide bandwidth FMCW radar sensor is used to measure the position of a spherical permanent magnet levitated by an electromagnet.

Courtesy: Saguaro National Park
MONDAY, 16 JANUARY 2017

**RWW Session: MO1A**

**RWW Distinguished Lecturers I**

Chair: Jeremy Muldavin, MIT Lincoln Laboratory
Co-Chair: Kevin Chuang, Nano-Semi Inc.

Room: Phoenix East/West

**RWS Session: MO1B**

**Advanced Reconfigurable RF/Microwave Electronics**

Chair: Roberto Gomez-Garcia, University of Alcala
Co-Chair: Dimitra Psalti, University of Colorado at Boulder

Room: Curtis AB

**SiRF Session: MO1C**

**Emerging Topics**

Chair: Dietmar Kissinger, IHP GmbH/TU Berlin
Co-Chair: Nils Pohl, Ruhr-University Bochum

Room: Remington

**PAWR Session: MO1D**

**Distortion Reduction Techniques in RF Power Amplifiers**

Chair: Gayle Collins, Nuvotronics Inc.
Co-Chair: Neil Braithwaite, Consultant

Room: Russell

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**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 bit rates of beyond 40 Gbps.

**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.

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**Exhibits/Wireless MicroApps/Demo**

**Industry Exhibits:**

Monday 16 January 13:00 - 17:30

and Tuesday 17 January 13:30 - 15:10

**Demo Session:**

Tuesday 17 January 13:30 - 15:15
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.

MO2A-2 Design, Challenges and “future” Solutions of LEO satellite constellations
Rainer Wansch, Fraunhofer-Institut für Integrierte Schaltungen IIS
Abstract: The talk will cover the specific possibilities of designing a proper constellation for LEO satellites. We will conclude with the main challenges and possible solutions to this task.

MO2B-1 Fiber-Wireless Integration for Future Mobile Communications (Invited)
G-K. Chang, L. Cheng, Georgia Institute of Technology, Atlanta, United States

MO2B-2 One-Way Wireless Clock Transfer for Coherent Distributed Arrays
R. L. Schmidt, T. M. Comberiate, J. E. Hodkin, J. A. Nanzer, Johns Hopkins University Applied Physics Laboratory, Laurel, United States, Michigan State University, East Lansing, United States

MO2B-3 Signal Design and Figure of Merit for Green Communication Links
E. McCune, Eridan Communications, Santa Clara, United States

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

MO2B-1 Applications of Gallium Nitride in MEMS and Acoustic Microsystems (Invited)
M. Rais-Zadeh, H. Zhu, A. Ansari, University of Michigan, Ann Arbor, United States, Jet Propulsion Laboratory, Pasadena, United States, California Institute of Technology, Pasadena, United States

MO2B-2 Accurate calculation of MEMS varactor based VCO phase noise using Multitone-FM Analysis
G. Kahmen, H. Schumacher, Rohde & Schwarz GmbH, Munich, Germany, Ulm University, Ulm, Germany

MO2B-3 High voltage level shifter for RF-MEMS control matrix with very low DC current leakage
C. Wipf, R. Sorge, IHP, Frankfurt (Oder), Germany

MO2B-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
<table>
<thead>
<tr>
<th>Time</th>
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<th>Chair</th>
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<tr>
<td>13:30</td>
<td>MO3A</td>
<td>Antennas, Arrays &amp; MIMO</td>
<td>Glaucio Fontgalland</td>
<td>K. Vincza, S. Gruszczynski</td>
<td>Phoenix East/West</td>
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<tr>
<td>13:30</td>
<td>MO3B</td>
<td>Millimeter-Wave Wireless Links</td>
<td>Kevin Chuang, NanoSemi</td>
<td>M. Hoflehner, S. Begashaw</td>
<td>Curtis AB</td>
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<tr>
<td>13:30</td>
<td>MO3C</td>
<td>Broadband &amp; Photonics</td>
<td>Chien-Nan Kuo ,</td>
<td>Kevin Chuang, NanoSemi</td>
<td>Remington</td>
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<td>13:30</td>
<td>MO3D</td>
<td>RF Power Amplifier Technology</td>
<td>Nick Cheng, Skyworks</td>
<td>D. Wong, H. Fung</td>
<td>Russell</td>
</tr>
</tbody>
</table>

**MO3A-1 Single-Layer Four-Beam Microstrip Antenna Array**
I. Slomian, K. Wincza, S. Gruszczynski, A. Springer, Johannes Kepler University, Linz, Austria

**MO3A-2 Orientation and Cancellation of Directional Interfering Signals based on a Radio Frequency Beamforming Array**
J. Chen1, D. Ye1, J. Hangfu1, C. LF1, L. Ran1, 2Zhejiang University, Hangzhou, China, 2Texas Tech University, Lubbock, United States

**MO3A-3 A Comparison of Cross-over and Cross-talk Cancelling Digital Predistorters for Multiple Antenna Transmitters**
P. Suryasarman, M. Hoflehner, A. Springer, Johannes Kepler University, Linz, Austria

**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

**MO3A-5 Inter-symbol Interference Suppression Scheme Employing Periodic Signals in Coded Network MIMO-OFDM Systems**
H. Suganuma, S. Saito, T. Maruko, F. Mbeiha, Waseda University, Tokyo, Japan

**MO3B-1 Multi-Gigabit High-Range Fixed Wireless Links at High Millimeter-wave Carrier Frequencies (Invited)**
I. Kalfass1, J. Antes1, A. Tessmann2, T. Zwicky2, R. Henneberger3, 1University of Stuttgart, Stuttgart, Germany, 2Fraunhofer Institute for Applied Solid State Physics, Freiburg, Germany, 3Karlsruhe Institute of Technology, Karlsruhe, Germany, 4Radiometer Physics GmbH, Meckenheim, Germany

**MO3B-2 Complete CMOS mmW Links for Consumer Volume and Cost Structure (Invited)**
J. Laskar, Maja Systems, Milpitas, United States

**MO3B-3 Experimental Demonstration of a Dual-channel E-band Communication Link using Commercial Impulse Radios with Orbital Angular Momentum Multiplexing**
H. Yeo1, H. Kumar1, T. El1, S. Sharma2, R. Henderson2, S. Ashraf2, D. MacFarlane2, Z. Zhao1, Y. Yao1, A. Wibner1, 1University of Texas-Dallas, Richardson, United States, 2NyGen Partners LLC, Dallas, United States, 3Southern Methodist University, Dallas, United States, 4University of Southern California, Los Angeles, United States

**MO3B-4 A 40 Gb/s PAM-4 Monolithically Integrated Photonic Transmitter in 0.25 µm SiGe:C BiCMOS EPIC Platform**
I. Garcia Lopez1, P. Rito1, D. Petousi1, L. Zimmermann1, M. Krot1, S. Lischke1, D. Knoll1, A. Amey1, A. C. Ulusoy1, D. Kissinger1, 1HP, Frankfurt (Oder), Germany, 2Michigan State University, East Lansing, United States, 3Technische Universität Berlin, Berlin, Germany

**MO3C-1 Millimeter-wave Ultra-Broadband IQ Transceiver Design - Current Status and Future Outlook (Invited)**
H. Alsuraisy1, 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

**MO3C-2 A 28 Gb/s 3-V Optical Driver with High Efficiency in a Complementary SiGe:C BiCMOS Technology**
P. Rito1, J. Garcia Lopez1, B. Heinemann1, A. Amey2, A. C. Ulusoy1, D. Kissinger1, 1HP, Frankfurt (Oder), Germany, 2Michigan State University, East Lansing, United States, 3Technische Universität Berlin, Berlin, Germany

**MO3C-3 Sub-THz Source Integrated in Industrial Silicon Photonic Technology targeting High Data Rate Wireless Applications**
E. Lacombe1,2, F. Gianesello1, C. Durand1, G. Ducournau2, C. Luxey2, D. Gloria2, 1STMicroelectronics, Crolles, France, 2EpOC-UNS, Biot, France, 3EMN, Villeneuve-d’Ascq, France

**MO3C-4 A 40 Gb/s PAM-4 Monolithically Integrated Photonic Transmitter in 0.25 µm SiGe:C BiCMOS EPIC Platform**
I. Garcia Lopez1, P. Rito1, D. Petousi1, L. Zimmermann1, M. Krot1, S. Lischke1, D. Knoll1, A. Amey1, A. C. Ulusoy1, D. Kissinger1, 1HP, Frankfurt (Oder), Germany, 2Michigan State University, East Lansing, United States, 3Technische Universität Berlin, Berlin, Germany

**MO3D-1 Design of Linear and Efficient Power Amplifiers by Generalization of the Doherty Theory (Invited)**
C. Fager1, W. Hallberg2, M. Özen3, K. Andersson3, K. Buisman3, A. Gustafsson4, 1Chalmers University of Technology, Göteborg, Sweden, 2University of California San Diego, La Jolla, United States, 3Ericsson AB, Göteborg, Sweden

**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

**MO3D-3 A Highly Integrated RF Frontend including Doherty PA, LNA and Switch for High SHF Wide-band Massive MIMO in 5G**
K. Nakatani1, Y. Komatsuzaki1, S. Shinjo1, K. Kamioka2, R. Komaru1, H. Nakamizo1, K. Miyawaki1, K. Yamana1, 1Mitsubishi Electric Corporation, Kamakura, Japan, 2Mitsubishi Electric Corporation, Itami, Japan

**PAWR Session: MO3D**
Chair: Mina Rais-Zadeh, National Chiao Tung University, Taipei, Taiwan, R.O.C, 2Texas Tech University, Lubbock, United States, 3Texas-Dallas, Richardson, United States, 4A. Willner, University of Southern California, Los Angeles, United States

**MONDAY, 16 JANUARY 2017**

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RWW STUDENT PAPER CONTEST

Chair: Holger Maune, TU Darmstadt

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

Interactive Poster Session: 15:40 – 16:40
Room: Atrium

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.

08:00
[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

08:20
[TU1A-3] 3D Printed On-Package Tripolar Antennas for Mitigating Harsh Channel Conditions
R. A. Ramirez1, M. Golmohamadi2, J. Frolik1, T. M. Wellers1, 1University of South Florida, Tampa, United States, 2University of Vermont, Burlington, United States

08:40
M. Kloc, R. Weigel, A. Koelpin, University of Erlangen-Nuremberg, Erlangen, Germany

09:00
[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 Reacher on Electromagnetics, Zhejiang University, Hangzhou, China, 2Nanjing Institute of Electronic Equipment, Nanjing, China, 3Department of Electrical and Computer Engineering, Texas Tech University, United States

09:20
Y. Matsuda, Y. Kozawa, Y. Umeda, Tokyo University of Science, Chiba, Japan

09:40
[WE4A-1] A Low-Power 190-255 GHz Frequency Quadrupler in SiGe BiCMOS Technology for On-chip Spectroscopic Applications
F. I. Jamaal1, M. H. Eissa1, J. Bomgrabber1, H. J. Ng2, D. Kissinger3, J. Wessel4, IHP, Im Technologiepark, Frankfurt (Oder), Germany, 1Technische Universität Berlin, Einsteinufer, Berlin, Germany

10:10
[TU4A-1] A Low-Power 190-255 GHz Frequency Quadrupler in SiGe BiCMOS Technology for On-chip Spectroscopic Applications
F. I. Jamaal1, M. H. Eissa1, J. Bomgrabber1, H. J. Ng2, D. Kissinger3, J. Wessel4, IHP, Im Technologiepark, Frankfurt (Oder), Germany, 1Technische Universität Berlin, Einsteinufer, Berlin, Germany

10:30
[MO3C-2] A 28 Gb/s 3-V Optical Driver with High Efficiency in a Complementary SiGe:C BiCMOS Technology
P. Rito1, I. García López2, B. Heinemann3, A. Awny1, A. C. Ullscho2, D. Kissinger4, IHP, Frankfurt (Oder), Germany, 1Michigan State University, East Lansing, United States, 2Technische Universität Berlin, Einsteinufer, Berlin, Germany

10:50
[TU3P] 0.1mm3 SiGe BiCMOS RX / TX Channel Front-Ends for 120 GHz Phased Array Radar Systems
E. Öztürk1, H. J. Ng2, W. Winkler2, D. Kissinger3, 1Silicon Radar GmbH, Frankfurt (Oder), Germany, 2IHP, Frankfurt (Oder), Germany, 3Technische Universität Berlin, Einsteinufer, Berlin, Germany

11:30
[WE2B-1] Non-uniform Coupler Based 2-20 GHz Six-Port Reflectometer
T. Lin, S. Gu, T. Lasri, Université Lille, Villeveuve d’Ascq Cedex, France

11:10
[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

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

12:00
Presenters and conference attendees discuss their most recent findings at the RWW2016 Interactive Poster Session (Courtesy of LylePhotos, Atlanta)

15:40
MO4D-1 Direct Design of Doherty and Chireix PAs using a Nonlinear Embedding Device Model (Invited)
P. Robin1, H-C. Chang1, C. Liang2, R. Aluamini1, F. Martinez-Rodriguez1, J. A. Galaviz-Aguilar1, J. A. Galaviz-Aguilar1, 1Ohio State University, Columbus, United States, 2National University of Mexico, Mexico City, Mexico, 3Instituto Politecnico Nacional, Tijuana, Mexico

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. Attal, 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. Wandrel2, Q-S. Schultz1, T. Quaich2, P. Watson2, W. Gouty2, 1InnoWave Inc., Mérinacq, United States, 2Air Force Research Lab, WPAFB, United States
**TUESDAY, 17 JANUARY 2017**

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<td>Passives I</td>
<td>Curtis AB</td>
<td>Chair: Glauco Fontgalland, Federal Univ. of Campina Grande, Brazil</td>
<td>Brazil</td>
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<td>RWS Session: TU1B</td>
<td>5G</td>
<td>Phoenix East/West</td>
<td>Chair: Rashaunda Henderson, UT Dallas, United States</td>
<td>United States</td>
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<td>Chair: Ahmet Cagri Ulusoy, Michigan State University, United States</td>
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<tr>
<td>SiRF Session: TU1C</td>
<td>mmWave &amp; THz Circuits</td>
<td>Remington</td>
<td>Chair: Dietmar Kissinger, IHP Microelectronics, Germany</td>
<td>Germany</td>
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<td>Co-Chair: Jennifer Kitchen, Arizona State University, United States</td>
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<td>TWIoS Session: TU1D</td>
<td>Internet of Space</td>
<td>Russell</td>
<td>Chair: Charlie Jackson, Northrop Grumman Corporation, United States</td>
<td>United States</td>
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<td>Co-Chair: Thomas Ussumer, University of Innsbruck, Austria</td>
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**TU1A-1 Wearable Passive UHF RFID Tag based on a Split Ring Antenna**

B. Warias, L. Ukkonen, J. Vrikki, T. Björninen, Tampere University of Technology, Tampere, Finland

**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. Kuroki2, Y. Hamada1, M. Numoto1, National Institute of Technology, Hiroshima, Japan, 1Mazda Motor Corporation, Hiroshima, Japan

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

R. A. Ramirez1, M. Golmohamadi2, J. Frolik1, T. M. Weller1, 1University of South Florida, Tampa, United States, 2University of Vermont, Burlington, United States

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

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

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

T. Inoue, National Instruments, Austin, 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

**TU1B-3 Absolute mm-Wave Power Sensor Using a Switching Quad Output Stage**

J. Wursthorn1,2, H. Knapp1, J. Al-Eryani1, K. Aufinger1, L. Maurer1, 1University of Wuppertal, Bochum, Germany, 2Ruhr-University Bochum, Bochum, Germany

**TU1B-4 An Integrated 240 GHz Differential Frequency Sixtupler in SiGe BiCMOS Technology**

A. Ergintav1, F. Herzel1, J. Borngraber1, 1Friedrich-Alexander-Universitat Erlangen-Nuernberg (FAU), Erlangen, Germany

**TU1B-5 A SiGe:C BiCMOS Driver/Balun/Switch Function Block for a 30 GHz Satcom Transmit Array**

I. Somesanu, H. Schumacher, Ulm University

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

J. Eisenbeis1, F. Boes1, B. Goettel1, S. Malz1, U. Pfeiffer1, T. Zwick1, Karlheinz Institute of Technology, Karlsruhe, Germany, 1University of Wuppertal, Wuppertal, Germany

**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. Aufinger1, N. Pohl1, Fraunhofer HFS, Wachtberg, Germany, 1Infineon Technologies AG, Neubiberg, Germany, 2Ruhr-University Bochum, Bochum, Germany

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

J. Wursthorn1,2, H. Knapp1, J. Al-Eryani1, K. Aufinger1, L. Maurer1, 1University of Wuppertal, Bochum, Germany, 2Ruhr-University Bochum, Bochum, Germany

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

A. Ergintav1, F. Herzel1, J. Borngraber1, 1Friedrich-Alexander-Universitat Erlangen-Nuernberg (FAU), Erlangen, Germany

**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-1 Liquid Crystal Technology for Reconfigurable SatCom Applications**

H. Maune1, C. Weichkamm1, M. Joos1, R. Reese1, M. Nickel1, C. Fritzsch1, R. Jakoby1, 1Technische Universität Darmstadt, Darmstadt, Germany, 2Merck KGaA, Darmstadt, 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

**TU1D-3 Configurable On-Board Processing for Flexible SatCom Communication Systems using FPGAs**

A. Hofmann1, R. Glein1, L. Frank1, R. Warsch1, A. Heuberger1, Fraunhofer Institute for Integrated Circuits, Erlangen, Germany, 1Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen, Germany

**TU1D-4 Right and Left circular polarized wave antenna system**

T. Kaneko1, H. Saito1, 1Nihon University, Japan, 2Japan Aerospace Exploration Agency, Japan

**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
TUESDAY, 17 JANUARY 2017

RWS Session: TU3A
3D & Novel Engineered Materials
Chair: Daniel Revier, Texas Instruments
Co-Chair: Katherine Duncan, CERDEC
Room: Curtis AB

RWS Session: TU3B
Terahertz Communications
Chair: Jae-Sung Rieh, Korea University
Co-Chair: Rashaunda Henderson, UT Dallas
Room: Phoenix East/West

RWW Joint Session
Demo Track

TWIoS Session: TU3D

13:30
TU3A-1 Fabrication and Characterization of CPW Transmission Lines With CoFe2O4 Nanomagnetic Thin Films
Y. He1, S. Pavlidis1, W. Chen2, E. Drew2, Z. J. Zhang1, J. Papapolymerou2, 1Michigan State University, East Lansing, United States, 2Georgia Institute of Technology, Atlanta, United States

TU3B-1 Impact of Modulation Type and Baud Rate on a 300 GHz Fixed Wireless Link
I. Dan1, S. Rey2, T. Merkle3, T. Kurner4, I. Kallfass5, 1University of Stuttgart, Germany, 2Technische Universität Braunschweig, Germany, 3Fraunhofer Institute of Applied Solid State Physics IAF, Freiburg, Germany

13:50
TU3A-2 W-Band InP Transmission Line Metamaterial
V. Nguyen, N. Caira, J. Hester, D. DiMarzio, E. Kaneshiro, A. Gutierrez-Alten, 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 Piettemeier, Technical University, Dresden, Germany

14:10
TU3A-3 3-D Printed Substrates for MMIC Packaging
S. Pavlidis1, B. Wright1, J. Papapolymerou2, 1Georgia Institute of Technology, Atlanta, United States, 2Michigan State University, East Lansing, United States

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

TU3D-1 Challenges of New Space (Keynote)
T. Burrell, Keysight Technologies, United States

14:30
TU3D-1 Creating Iridium (Keynote)
D. Hills, Motorola Space and Defense Group (Retired), United States

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

(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

[NU3P-1] Forward Modeling Assisted 1-Bit Data Acquisition Based Model Extraction for Digital Predistortion of RF Power Amplifiers
- H. Wang, G. Li, Y. Zhang, F. Liu, A. Zhu, University of Science and Technology of China, Hefei, China

- C. Li, Y. Yamao, University of Tokyo, Japan

[NU3P-3] Joint RF Pre-distortion and Post-distortion Linearization of Small Cell Power Amplifiers
- Y. Hu, S. Boumaiza, University of Waterloo, Canada

[NU3P-4] Wideband Digital Predistortion with Sub-Nyquist Nonuniform Sampling and Reconstruction of Feedback Path
- T. Gotthans, R. Mar’s ale, J. Gotthans, University of Technology, Brno, Czech Republic

[NU3P-5] Auxiliary Power Tracking Technique for Linearity Improvement of 10 W GaN HEMT PA with and without Power Gate Tracking
- D. Gecan, M. Olavsrøen, K. M. Gjertsen, Norwegian University of Science and Technology (NTNU), Trondheim, Norway

[NU3P-6] Using a Cascade of Digital and Analog Predistorters to Linearize a Dual-Band RF Transmitter
- R. Neil Braithwaite, Consultant, Orange, United States

[NU3P-7] 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

[NU3P-8] Optimized Output Baluns for Wideband Differential Class D PAs
- M. Kamper, G. Fischer, Fraunhofer Institute for Integrated Circuits IIS, Erlangen, Germany

[NU3P-9] GaN-on-Si Switched Mode RF Power Amplifiers for Non-Constant Envelope Signals
- S. Shukla, Morgan State University, Baltimore, United States

- M. A. Reece, S. Conlee, C. W. Waykay, Morgan State University, Baltimore, United States

[NU3P-11] A reliable experimental procedure for Volterra parameter identification in wireless systems
- Carlos Crespo-Cadenas, Javier Reina-Tosina, Marí a J. Madero-Ayora, Escuela Tecnica Superior de Ingeniera, University of Seville, Sevilla, Spain

[NU3P-12] A GaN Power Amplifier for 100 VDC Bus in GPS L-band

[NU3P-13] Mitigation of Resonance in RF High Power Amplifier enclosure
- S. Theepek, V. S. Nambru, B. Devadas, R. Selvapriya, Centre for Development of Telematics, Bangalore, India

[NU3P-14] 5.1mm SiGe BiCMOS RX / TX Channel Front-Ends for 120 GHz Phased Array Radar Systems
- E. Oeztürk, H. J. Ng, W. Winkler, K. Kissing, Silicon Radar GmbH, Frankfurt (Oder), Germany

[NU3P-15] A 38 Gb Low-Loss Reflection-Type Phase Shifter
- L. Huang, Y. Lin, C. Kuo, National Chiao Tung University, Hsinchu, Taiwan

[NU3P-16] 1W < 0.9dB IL DC-20G Hz T/R Switch Design with 45nm SOI Process
- C. Li, G. Freeran, M. Boenke, H. Cahoon, K. Kodak, G. Rebeiz, Global Foundries, United States, USC San Diego, United States

[NU3P-17] A G Band +2 dBm Balanced Frequency Doubler in 55 nm SiGe BiCMOS

- D. Parvey, M. Varonen, A. Safaripour, S. Bowers, T. Tikka, P. Kangashlahti, T. Gaiel, A. Hajimiri, K. A. I. Halonen, Aalto University, Espoo, Finland, California Institute of Technology, Pasadena, United States

[NU3P-19] A 10-GS/s Track-and-Hold Circuit for a 7-bit Square Kilometer Array ADC in 65-nm CMOS
- G. Wu, E. Zailer, L. Belostotski, J. W. Haskett, R. Plume, University of Calgary, Calgary, Canada

[NU3P-20] 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

[NU3P-21] Ultra Sub-wavelength Giagahertz Resonator for Constructing Silicon-substrate Metamaterials
- C. Cao, D. Ye, J. Hangfu, S. Qiao, C. Li, L. Ran, Laboratory of Applied Reacher on Electromagnetics (ARE), Zhejiang University, Hangzhou, China

[NU3P-22] Flexible Si BiCMOS on Plastic Substrates
- J. Seo, K. Zhang, W. Zhou, Z. Ma, University of Wisconsin-Madison, Madison, United States

[NU3P-23] 60V P- and NMOS Transistor 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 Group, Northrop Grumman Corporation Linquist, United States
TUESDAY, 17 JANUARY 2017

RWS Session: TU4A
Bio Medical Wireless Technologies and Systems
Chair: Katia Grenier, LAAS-CNRS
Co-Chair: Changzhi Li, Texas Tech University
Room: Curtis AB

RWS Session: TU4B
Passive Components
Chair: Roberto Gomez-Garcia, University of Alcala
Co-Chair: Dimitra Psychogiou, University of Colorado at Boulder
Room: Phoenix East/West

SIRF Session: TU4C
Efficient RF Power Generation
Chair: Harish Krishnaswamy, Columbia University
Co-Chair: Nils Pohl, Ruhr-University Bochum
Room: Remington

TWIoS Session: TU4D
Invited Talks
Chair: Thomas Ussmueller, Universität Innsbruck
Co-Chair: Charlie Jackson, Northrop Grumman
Room: Rusell

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. Bombraber2, H. J. Ng3, D. Kissinger4, J. Weese5, 1IHP, Im Technologiepark, Frankfurt (Oder), Germany, 2Technische Universität Berlin, Einsteinufer, Berlin, Germany

TU4A-2 Hand Gesture Recognition Based on Wi-Fi Chipsets
T. Fan1, D. Ye1, J. Hangfu1, Y. Sun1, C. LP1, L. Ran1, 1Laboratory of Applied Reacher on Electromagnetics, Zhejiang University, Hangzhou, China, 2Nanjing Institute of Electronic Equipment, Nanjing, China, 3Department of Electrical and Computer Engineering, Texas Tech University, United States

TU4A-3 A 10 Gb/s Highly-Integrated Adaptive Pseudo-Noise Transmitter for Biomedical Applications
C. Schmidt1, J. Nehring2, M. Dietz2, R. Weigel2, D. Kissinger2, A. Hagelaue2, 1FAU Erlangen-Nürnberg, Erlangen, Germany, 2Technische Universität Berlin, Einsteinufer, Berlin, Germany

TU4A-4 Through-wall Detection of Wearable Electronic Devices
V. Nair, L. Krishnamurthy, J. Swan, A. Essaian, T. Frank, M. Bynum, Intel Corporation, Chandler, United States

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

TU4B-2 Low-loss RF Filter through a Combination of Additive Manufacturing and Thin-film Process
L. Hernandez1, A. Kaur2, Y. He3, J. Papapolymerou4, P. Chatha5, 1University of California Riverside, Riverside, United States, 2Georgia Institute of Technology, Atlanta, United States, 3University of Michigan, Ann Arbor, United States, 4Michigan State University, East Lansing, United States

TU4B-3 Dielectric powder loaded coaxial-cavity filters
S. Bulja, F. Pivit, E. Doumanis, Transceiver Devices, Dublin, Ireland

TU4B-4 Investigation of Surface Roughness Effects for D-band SW Transmission Lines on LCP Substrate
S. Li1, M. Yi2, S. Pavlidis2, H. Yu1, 1Munich University of Technology, Munich, Germany, 2Pacific Northwest National Laboratory, Richland, Washington, United States

TU4B-5 A Substrate-Integrated-Waveguide Dual-Band Bandpass Filter Based on Signal-Interference Principles
J. Munoz-Ferreras1, D. Psychogiou2, R. Gomez-Garcia3, D. Peroulis4, 1Univ. Alcal’a, Alcal’a de Henares, Spain, 2Purdue Univ., West Lafayette, United States

TU4C-1 RF Power Generation Using Digitally-Tuned CMOS Technologies (Invited)
J. Kitchen, Arizona State University, Tempe, 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

TU4C-3 A 28-nm CMOS 40-GHz Oscillator for Automotive Radar Applications
J. Bai, J. Lee, J. Zhang, N. Rohani, NXP Semiconductors, Tempe, United States

TU4C-4 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. Sugiuira2, T. Yoshimasa3, 1Waseda University, Japan, 2IT-Kyakushu-shi, Japan, 3Samsung R&D Institute, Yokohama, Japan

TU4C-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

TU4D-1 The Internet of Space: New Satellite Communication Systems, Technologies and Production Strategies (Invited)
I. Wolff, IMST GmbH, Kempt-Lintfort, Germany

TU4D-2 The Role of Geostationary (GEO) Space Based Networks (Invited)
R. K. Gupta, Ligado Networks, Reston, United States

TU4D-3 IEEE Future Directions Committee (FDC) on Internet of Space (Invited)
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<tr>
<td>08:00</td>
<td>RWS</td>
<td>WE1A Passives II</td>
<td>Chair: Wonbin Hong, University of Science and Technology Co-Chair: Kiavash Faraji, Google</td>
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<td>08:20</td>
<td>WiSN</td>
<td>WE1B Wireless sensors for Communication, Radar, Positioning &amp; Imaging Applications</td>
<td>Chair: Rahul Khanna, Intel Co-Chair: Luca Roselli, University of Perugia</td>
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<td>08:40</td>
<td>SiRF</td>
<td>WE1C Technology, Devices &amp; Modeling</td>
<td>Chair: Paul Hurwitz, TowerJazz Co-Chair: Parha Chakraborty, NXP Semiconductors</td>
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<td>08:40</td>
<td>TWoS</td>
<td>WE1D New Space and Commercial Space</td>
<td>Chair: Nick Sturdivant, MPT Inc. Co-Chair: Thomas Ussmueller, University of Innsbruck</td>
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<tr>
<td>08:40</td>
<td></td>
<td>WE1A-1 A Dual-Layer FSS-Based Corner Reflector for Radiation Diversity of a Monopole Antenna</td>
<td>A. Chatterjee, S.K. Parui, Indian Institute of Engineering Science &amp; Technology, West Bengal, India</td>
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<tr>
<td>08:40</td>
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<td>WE1B-1 Future Proof IoT (invited)</td>
<td>T. Abels, Intel Corporation, Hillsboro, United States</td>
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<td>08:40</td>
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<td>WE1C-1 Experimental Verification of TACAO simulation for high-performance SiGe HBTs</td>
<td>J. Korn, H. Rucker, B. Heinemann, IHP, Frankfurt, Germany</td>
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<td>08:40</td>
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<td>WE1D-1 Low Cost Ka-Band Transmitter for CubeSat Systems</td>
<td>K. Potter, Y.H. Shu, M. McNicholas, J. DeLuna, SAGE Millimeter, Torrance, United States</td>
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<td>08:40</td>
<td></td>
<td>WE1A-2 An Antenna Having Wide Radiation Pattern but Narrow Beam in Operation Based on Monopulse System for Security Gate Applications at UHF Band</td>
<td>K. Aoki, T. Sakogawa, F. Kroki, National Institute of Technology, Kure College, Hiroshima, Japan</td>
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<td>08:40</td>
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<td>WE1B-2 Doppler-Radar-Based Short-Range Acquisitions of Time-Frequency Signatures from an Industrial-Type Wind Turbine</td>
<td>J.M. Munoz-Ferreras, Z. Peng, Y. Tang, R. Gomez-Garcia, C. Li, Universidad Alcala, Alcala de Henares, Spain, Texas Tech University, Lubbock, United States</td>
</tr>
<tr>
<td>08:40</td>
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<td>WE1A-3 A Polarization-Reconfigurable Microstrip Antenna Design Based on Parasitic Pin Loading</td>
<td>H. Begum, X. Wang, M. Lu, Nanjing University of Aeronautics and Astronautics, Jiangsu, China, West Virginia Institute of Technology, Montgomery, United States</td>
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<td>08:40</td>
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<td>WE1B-3 A Frequency-Multiplexed Doppler-plus-FMCW Hybrid Radar Architecture: Theory and Simulations</td>
<td>J.M. Munoz-Ferreras, Z. Peng, R. Gomez-Garcia, C. Li, Universidad Alcala, Alcala de Henares, Spain, Texas Tech University, Lubbock, United States</td>
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<td>08:40</td>
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<td>WE1C-3 Modeling of SiGe HBTs with ( f_\text{cut} ) of (340, 560) GHz Based on Physics-based Scalable Model Parameter Extraction</td>
<td>A. Pawlak, M. Schroter, Technische Universität Dresden, Dresden, Germany, UC San Diego, La Jolla, United States</td>
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<td>08:40</td>
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<td>WE1A-4 A 6-18 GHz Wideband SIW H-Plane Dual-Ridged End-Fire Antenna</td>
<td>J. Li, Y. Huang, R. Wang, Y. Wang, G. Wei, University of Electronic Science and Technology of China, Sichuan, China</td>
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<td>WE1B-4 A 6-18 GHz Wideband SIW H-Plane Dual-Ridged End-Fire Antenna</td>
<td>J. Li, Y. Huang, R. Wang, Y. Wang, G. Wei, University of Electronic Science and Technology of China, Sichuan, China</td>
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<td>08:40</td>
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<td>WE1C-4 A D-band Tuner for In-situ Noise and Power Characterization in BiCMOS 55 nm</td>
<td>S. Bouvoy, A. Bossuet, T. Quemerais, G. Doucoureau, F. Danneville, E. Lauga-Larroze, D. Glorita, IMEP, Villeneuve-d’Ascq, France, STMicroelectronics, Crolles, France, IMEP-LAHC, Grenoble, France</td>
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<td>08:40</td>
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<td>WE1D-4 Dual Band Wireless Power and Data Transfer for Space-Based Sensors</td>
<td>D. Belo, R. Correia, F. Pereira, N. Borges de Carvalho, Universidade de Aveiro, Aveiro, Portugal</td>
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<td>09:00</td>
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<td>WE1B-5 Target Evaluation for High Accuracy 80 GHz FMCW Radar Distance Measurements</td>
<td>S. Scherner, R. Afroz, S. Ayhan, S. Thomas, T. Jeeschke, M. Paul, N. Pohl, T. Zwicky, Institute of Radio Frequency Engineering and Electronics, KIT, Germany, Fraunhofer-Institut fur Hochfrequenzphysik und Radatechnik, Wachtberg, Germany, Institute of Integrated Systems, RUB, Germany</td>
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<td>09:20</td>
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<td>WE1C-5 A D-band Passive Receiver with 10 dB Noise Figure for In-situ Noise Characterization in BiCMOS 55nm</td>
<td>S. Bouvoy, T. Quemerais, J.C. Azavedo Goncalves, S. Lepilliet, G. Doucoureau, F. Danneville, D. Glorita, IMEP, Villeneuve-d’Ascq, France, STMicroelectronics, Crolles, France</td>
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<tr>
<td>09:20</td>
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<td>WE1D-5 System Latency Performance of Mechanical and Electronic Scanned Antennas for Low Ground Stations for IoT and Internet Access</td>
<td>R. Sturdivant, E.K.P. Chong, Microwave Products and Technology, Inc., Fullerton, United States, Colorado State University, Fort Collins, United States</td>
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### RWW Session: WE2A
**Wireless Architecture & Modeling**
Chair: Rashaunda Henderson, UT Dallas
Co-Chair: Jeremy Muldavin, MIT Lincoln Laboratory
Room: Curtis AB

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<tr>
<td>WE2A-1</td>
<td>Measurement-based Channel Modeling for mmWave Wireless Links in Enclosed Server Platforms</td>
<td>G. Wang¹, K. Zhan¹, T. Kamgai², R. Khanna¹, H. Liu¹, A. Natarajan³, Oregon State University, Corvallis, United States, Intel Corporation, Hillsboro, United States</td>
</tr>
<tr>
<td>WE2A-2</td>
<td>A Direct RF-to-Baseband Quadrature Subsampling Receiver Using a Low Cost ADC</td>
<td>M. Habert, B. Sanftl, M. Trautmann, R. Weigel, A. Koelpin, University of Erlangen-Nuremberg, Erlangen, Germany</td>
</tr>
<tr>
<td>WE2A-3</td>
<td>Radar Waveform Optimization for Ambiguity Function Properties and Dynamic Spectral Mask Requirements Based on Communication Receiver Locations</td>
<td>C. Latham¹, M. Fellows¹, C. Baylis², L. Cohen², R.J. Marks II, Baylor University, Waco, United States, ¹Naval Research Laboratory, Washington D.C., United States</td>
</tr>
<tr>
<td>WE2A-4</td>
<td>Performance of Adaptive Movable Access Point System in the Presence of Positioning Error</td>
<td>S. Oka¹, T. Murakami², Y. Takatori², M. Mizoguchi³, F. Maehara³, ¹Waseda University, Shinjuku, Japan, ²Kanagawa University, Yokohama, Japan, ³Nippon Telegraph and Telephone Corporation, Tokyo, Japan</td>
</tr>
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### WiSNet Session: WE2B
**Six-Port & Multi-Port Technology**
Chair: Tu Canh Lasri, IEEM-University of Lille
Co-Chair: Luca Roselli, University of Perugia
Room: Phoenix East/West

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<td>WE2B-1</td>
<td>Non-uniform Coupler Based 2-20 GHz Six-Port Reflectometer</td>
<td>T. Lin, S. Gu, T. Lasri, Universite Lille, Villeuve d’Ascq Cedex, France</td>
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<tr>
<td>WE2B-2</td>
<td>Detector Nonlinearity in Six-Port Radar</td>
<td>S. Linz, C. Will, F. Lurz, S. Lindner, S. mann, R. Weigel, A. Koelpin, University of Erlangen-Nuremberg, Erlangen, Germany</td>
</tr>
<tr>
<td>WE2B-3</td>
<td>Segmental Polynomial Approximation based Phase Error Correction for Precise Near Field Displacement Measurements using Six-Port Microwave Interferometers</td>
<td>C. Will, S. Linz, S. Mann, F. Lurz, S. Lindner, R. Weigel, A. Koelpin, University of Erlangen-Nuremberg, Erlangen, Germany</td>
</tr>
<tr>
<td>WE2B-4</td>
<td>Six-Port Reflectometer With Tunable Parameters Ensuring Measurement Accuracy Enhancement</td>
<td>K. Staszek, J. Sorocki, K. Wincza, S. Gruszczynski, AGH University of Science and Technology, Krakow, Poland</td>
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<td>WE2B-5</td>
<td>An Improved-Performance V-band Six-Port Receiver for Future 5G Short-Range Wireless Communications</td>
<td>C. Hannachi, E. Moldova, S.O. Tatu, Institut National de la Recherche Scientifique, Montreal, Canada</td>
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### RWS-SiRF Joint Session: WE2C
**Advanced Wireless Transceiver**
Chair: Ahmet Cagri Ulusoy, Michigan State University
Co-Chair: Tian Wei Huang, National Taiwan University
Room: Remington

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<tr>
<td>WE2C-1</td>
<td>Fully-Integrated Non-Magnetic Non-Reciprocal Components Based on Linear Periodically-Time-Varying Circuits (Invited)</td>
<td>N. Reiskarimian, H. Krishnaswamy, Columbia University, New York, United States</td>
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<tr>
<td>WE2C-3</td>
<td>Radar Waveform Optimization for Ambiguity Function Properties and Dynamic Spectral Mask Requirements Based on Communication Receiver Locations</td>
<td>C. Latham¹, M. Fellows¹, C. Baylis², L. Cohen², R.J. Marks II, Baylor University, Waco, United States, ¹Naval Research Laboratory, Washington D.C., United States</td>
</tr>
<tr>
<td>WE2C-4</td>
<td>Performance of Adaptive Movable Access Point System in the Presence of Positioning Error</td>
<td>S. Oka¹, T. Murakami², Y. Takatori², M. Mizoguchi³, F. Maehara³, ¹Waseda University, Shinjuku, Japan, ²Kanagawa University, Yokohama, Japan, ³Nippon Telegraph and Telephone Corporation, Tokyo, Japan</td>
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<tr>
<td>WE2C-5</td>
<td>2V-5 60W Programmable Gain High Linearity 2.5GHz SiGe BiCMOS Power Amplifier with Integrated LO and Harmonic Blooming Suppression</td>
<td>J.S. Syu¹, W.L. Chang¹, C. Meng¹, Y.C. Lin¹, G.W. Huang¹, ¹National Chiao Tung University, Hsinchu City, Taiwan, ²National Nano Device Laboratories, Hsinchu, Taiwan</td>
</tr>
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WE3P: Joint RWW Interactive Poster Session
13:30-15:30

Room: Atrium

[WE3P-1] 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

[WE3P-2] Target Localization using Multi-static UWB Sensor for Indoor Monitoring System
R. Nakamura, H. Hadama, National Defense Academy of Japan, Kanagawa, Japan

[WE3P-3] Novel Concept of RF Hardware for Remote Sensing Technologies
V. Nesterov, D. Fedotov, Dr. H. Kim, S1 Samsung R&D Center, Moscow, Russian Federation

[WE3P-4] Full-Duplex Backscatter System Using a Bluetooth Low Energy (BLE) Receiver
J.F. Ensworth1, A.T. Hoang2, T.Q. Phu1, M.S. Reynolds1,2, ‘Department of Electrical Engineering, University of Washington, Seattle, United States, ‘Department of Computer Science and Engineering, University of Washington, Seattle, United States

[WE3P-5] Autonomous Learning Approach to Characterizing Motion Behavior
A. Hasaware1, R. Anil2, H. Khanna3, A.S. Keshavamurthy4, R. Khanna1, Intel Corporation, Hillsboro, United States

[WE3P-6] Distributed Estimation of a Parametric Field under Energy Constraint
M. Alkhweldi1, West Virginia University, Morgantown, United States, 2University of Washington, Seattle, United States, 1College of Computer Science and Engineering, University of Washington, Seattle, United States

K. Jimi, I. Matsunami, The University of Kitakyushu, Fukuoka, Japan

[WE3P-8] 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

[WE3P-9] 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

[WE3P-10] 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

[WE3P-11] Constrained Identification of Rational Functions for Robust Digital Predistortion
A. Islam, P.J. Xia, H. Huang, S. Boumaiza, University of Waterloo, Waterloo, Canada

[WE3P-12] Wireless Device Classification Through Transmitter Imperfections - Evaluation of Performance Degradation Due to the Chip Heating
M. Popisil, R. Marsalek, T. Gotthans, Brno University of Technology, Brno, Czech Republic

[WE3P-13] Design and Experimental Validation of a Simple Antenna De-embedding Approach for mmWave Channel Modeling
S. Li1, R. Zhang2, C. Cao1, X. Zou3, ‘Communications Technologies Laboratory, Huawei Technologies Co. Ltd., Chengdu, China, 2Communications Engineering Department, Northwestern Polytechnical University, Xi’an, China

[WE3P-14] Electro-Textile Slotted Patch Antenna for Wearable Passive UHF RFID Tags
A. Liu1, Z. Wei1, X. Chen2, L. Ukkonen2, J. Virkk2, T. Bjorninen2, ’City University of Hong Kong, Kowloon, Hong Kong, ’Tampere University of Technology, Tampere, Finland

[WE3P-15] A 3.1 to 4.6 GHz 3-bit Reconfigurable Bandpass Filter Using A/4 Microstrip Resonators and Chip Inductor Coupling
Y. Kada, Y. Yamao, Advanced Wireless & Communication Research Center, University of Electro-Communications, Tokyo, Japan

[WE3P-16] Rat-Race Directional Couplers Operating in Differential Mode
I. Plekarz, J. Sorocki, K. Wincza, S. Gruszczynski, AGH University of Science and Technology, Krakow, Poland

[WE3P-17] Low Insertion Loss 60 GHz CMOS H-shaped Resonator BPF
A. Barakat1, N. Mahmoud1, R.K. Pokharel1, Kyushu University, Fukuoka, Japan, 2Tanta University, Tanta, Egypt, 3Electronics Research Institute, Giza, Egypt

[WE3P-18] 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

[WE3P-19] MRI RF Pulse Spectral Regrowth Contributions by PIN Diodes
R.H. Caverly, Villanova University, Villanova, United States

[WE3P-20] Dielectric Notch Radiator Antennas with Integrated Filtering For 5G and IoT Access
R. Studiviant1, E.K.P. Chong1, ’MPT, Fullerton, United States, ’Colorado State University, Fort Collins, United States

[WE3P-21] 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. Nagasundaram1, J. Lees2, D. Mirshekar-Syahkali2, ’Swansea University, Swansea, Wales, United Kingdom, ’Cardiff University, Cardiff, Wales, United Kingdom, ’Essex University, Colchester, United Kingdom

Z. Wei1, A. Liu1, X. Chen1, B. Wanas2, L. Ukkonen2, T. Bjorninen2, J. Virkk2, ’City University of Hong Kong, Kowloon, Hong Kong, ’Tampere University of Technology, Tampere, Finland

Chair: Rashaunda Henderson, UT Dallas
Co-Chair: Jeremy Muldavin, MIT Lincoln Laboratory
WEDNESDAY, 18 JANUARY 2017

RWS Session: WE4A
SDR & Cognitive Radio
Chair: Abbas Omar, University of Magdeburg
Co-Chair: Rui Ma, Mitsubishi Electric Research Laboratories
Room: Curtis AB

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

16:00
WE4A-2 Novel Baseband Equivalent Models of Quadrature Modulated All-Digital Transmitters
O. Tanovic1,2, R. Ma1, K.H. Teo1, Mitsubishi Electric Research Laboratories, Cambridge, United States, Massachusetts Institute of Technology, Cambridge, United States

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. Viveiros1, A. Danziger1, A. Hedden1, J. Pierr1, R.J. Marks II1, Baylor University, Waco, United States, Army Research Laboratory, Adelphi, United States

16:40
WE4A-4 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 Session: WE4B
Sensors for IoT Applications
Chair: Luca Roselli, University of Perugia
Co-Chair: Rahul Khanna, Intel
Room: Phoenix East/West

16:00
WE4B-1 Throughput Improvement by Cluster-Based Multihop Wireless Networks with Energy Harvesting Relays
V. Singh, H. Ochiai, Yokohama National University, Kanagawa, Japan

16:20
WE4B-2 Performance Analysis of a Ultra-Compact Low-Power Rectenna in Paper Substrate for RF Energy Harvesting
V. Palazzi1, C. Kalialakis1, F. Alimenti1, P. Mezzarotte1, L. Roselli1, A. Collado1, A. Georgiadis1, University of Perugia, Perugia, Italy, Centre Tecnologico de Telecomunicaciones de Catalunya, Castelldefels, Spain, Heriot-Watt University, Edinburgh, United Kingdom

16:40
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

17:00
WE4B-4 A Simple CoMP Transmission Method Employing Vehicle Position Information for Taxi Radio Systems
N. Kunihara, K. Ujihara, F. Maehara, Waseda University, Tokyo, Japan

Enjoy the wonderful views from the Hyatt Regency Phoenix!

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Room: Atrium

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- Mitsubishi Electric US
- National Instruments
- Sonnet
- MOSIS
- Maury Microwave Corporation
- IHP GmbH
- Altair Engineering
- Virginia Diodes, Inc.
- Advanced Test Equipment Rentals
- CST of America
- IEEE MTT-S

**Booth**

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Exhibition/Poster Presentation Floor Map (Atrium):
Address:
122 North Second Street
Phoenix, AZ 85004
USA

Telephone:
+1 (602) 252-1234

From Sky Harbor International Airport:
Exit the airport onto Interstate 10 West. Take Interstate 10 west to exit 145A, the 7th St. exit. From the exit, go south onto 7th St. to Van Buren St. Turn right onto Van Buren and travel six blocks to 2nd St. Take a left onto 2nd St. one block. Hyatt Regency Phoenix entrance is one block on the right side of street. Drive Time: approximately 15 minutes, an estimated four miles from the hotel.

From Sedona/Flagstaff and North:
Follow Interstate 17 South to Interstate 10. Continue to travel south and toward the right to 200A/Tucson/Los Angeles and keep to the left toward central Phoenix. Merge onto Interstate 10 eastbound and continue east on Interstate 10 to the 7th St. exit, exit 145A. Take the exit ramp and travel south on 7th St. approximately six blocks to Van Buren St. Turn right onto Van Buren St. and travel five blocks to 2nd St. Take a left onto 2nd St. for one block. Hyatt Regency Phoenix entrance is one block on the right side of street. Drive Time: approximately 2 hours and 15 minutes.

From Tucson and South:
Follow I-10 West toward Phoenix. Travel west on Interstate 10 to exit 145A, the 7th St. exit. Take the exit ramp and travel south on 7th St. approximately six blocks to Van Buren St. Turn right onto Van Buren St. and travel five blocks to 2nd St. Take a left onto 2nd St. for one block. Hyatt Regency Phoenix entrance is one block on the right side of street. Drive Time: approximately 2 hours.

From Los Angeles and Points West:
Take I-10 East toward San Bernardino, crossing into Arizona toward Phoenix and exit at exit 145A, the 7th St. exit. Take the exit ramp and travel south on 7th St. approximately six blocks to Van Buren St. Turn right onto Van Buren St. and travel five blocks to 2nd St. Take a left onto 2nd St. for one block. Hyatt Regency Phoenix entrance is one block on the right side of street. Drive Time: approximately 6 hours.

From Southern California and Southwest:
Take I-8 East to Gila Bend, AZ for approximately 275 miles. Take Route 85 North to I-10 East toward Phoenix exit 145A, the 7th St. exit. Take the exit ramp and travel south on 7th St. approximately six blocks to Van Buren St. Turn right onto Van Buren St. and travel five blocks to 2nd St. Take a left onto 2nd St. for one block. Hyatt Regency Phoenix entrance is one block on the right side of street. Drive Time: approximately 6 hours and 15 minutes.
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