2008 IEEE Radio and Wireless Symposium

Incorporating WAMICON

ADVANCE PROGRAM

Orlando Florida
22 – 24 January, 2008

General Chair:
Aly E Fathy, *University of Tennessee*

General Co-Chair:
Richard Abrahams, *Harris GCSD RF/Microwave Engineering*

Technical Program Chair:
Afshin Daryoush, *Drexel University*

Technical Program Co-Chairs:
Peter Hill, *Cranfield University (Europe)*
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Proceedings Editor:
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http://www.radiowireless.org

IEEE MTT-S IEEE COMMUNICATIONS SOCIETY

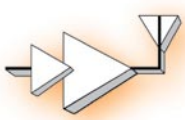
GENERAL CHAIRMAN'S INVITATION TO THE IEEE RADIO AND WIRELESS WEEK

The IEEE Radio and Wireless Symposium (RWS) incorporating WAMICON conference, is organized and sponsored by the Microwave Theory and Techniques, the Communication, and the Antennas and Propagation societies all of the Institute of Electrical and Electronics Engineering (IEEE) and is the centerpiece of the radio and wireless week. RWS has always focused on the intersection between radio systems and wireless technology, which creates a unique forum for engineers to discuss various aspects of wireless systems and the state-of-the-art in both fields by exploring the connections between hardware design and system performance.

This year, we continue this tradition with an expanded program offering the latest information on our traditional subjects of wireless communications, wireless networking, and their associated enabling technologies. In addition, we have added several subjects to our technical program: radio on fiber and optical techniques for UWB communications, software defined radio/cognitive radio, and seamless mobility and all-IP mobile networks. We have received over 437 papers in our regular submission and 40 "Late News" papers discussing the latest on all aspects of radio and wireless communication. We plan to have 28 technical sessions, and only one poster session this year. To accommodate the expanded technical program, three-parallel sessions format will be followed at all three RWS symposium days with a combination of invited (30 minutes), long (20 minutes), and short (10 minutes) technical papers. A number of papers that require much longer time to discuss finer points of the presented papers are categorized under interactive poster session. No other parallel sessions are to be held during this two hours time period on Wednesday 23 January 2008.

In addition to our technical program, we have expanded the workshop offerings to include 6 workshops on Sunday and Monday and 2 short courses on Friday. The topics are reflective of those in the technical sessions, but will be presented in an informal format, offering increased opportunities for exchange between the speakers and audience. The Keynote Address, by Jerry D. Neal, RF Micro Devices, will discuss the history of wireless technology in the last 100 years with emphasis on IC which has significantly contributed to the the modern day cell-phone communication. The Wednesday night Banquet will feature an address by Charlie Jacklson, and our yearly student competition awards ceremony. Finally, our Rump Session promises an interesting talk on test tools for the characterization of complex wireless signals. One of the advantages of having our meeting in the Rosen Hotel is the close proximity of the exhibits to the technical sessions to encourage a timely interaction among attendees and commercial exhibitors and provide ample opportunity for networking and interaction with the leading professionals in the field. More than 40 booth spaces have been allocated to allow vendors to show their latest wares to the technical attendees on Tuesday and Wednesday. As always, your feedback is greatly appreciated that will help us chart the future of your symposium. In closing, we wish to thank you for your support and hope to see you shortly in Orlando.

POWER AMPLIFIER SYMPOSIUM JANUARY 21 & 22, 2008



The IEEE Topical Symposium on Power Amplifiers for Wireless Communications will be held during Monday, January 21, and Tuesday, January 22, 2008 at Orlando, Florida.

The IEEE Power Amplifier Symposium, known in prior years as the Power Amplifier Workshop, will be held in conjunction with the IEEE Radio and Wireless Symposium and the Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems, as part of Radio and Wireless Week. These conferences and a vendor exhibition, will take place in Orlando during January 20-25, 2008.

Power amplifiers are a vital enabling technology for emerging wireless communications systems, and are evolving rapidly under the dual pressures of providing improved efficiency and improved linearity. This meeting seeks to provide a forum for innovative work in the area of power amplifiers, including requirements for and accomplishments in amplifiers for both handsets and base stations.

Papers are solicited in the following areas:
-Devices for power amplifiers - Si and III-V based
-IC technology for power amplifiers
-Modeling and design techniques for power amplifiers
-System requirements and transmitter architectures
-Linearization techniques for handsets and base stations
-Measurement techniques
-Circuits for WiFi, WiMAX and mm-wave networks

Invited papers highlighting state-of-the-art developments from around the world will also be presented. On Monday evening, a symposium Reception will be held, allowing attendees to mix in an informal setting. For those with separate tickets, a Banquet will be held later on Monday evening.

For further information, visit the Website
http://PASymposium.ucsd.edu
Paul Draxler, pdraxler@qualcomm.com

8TH TOPICAL MEETING ON SILICON MONOLITHIC INTEGRATED CIRCUITS IN RF SYSTEMS – JANUARY 23–25, 2008

Conference Chair: Zhenqiang (Jack) Ma, *University of Wisconsin-Madison*

Technical Program Co-Chairs:
Dimitrios Peroulis, *Purdue University*
Liang-Hung Lu, *National Taiwan University*

Publicity Chair:
Guofu Niu, *Auburn University*

Finance Chair:
Alex Margomenos, *EMAG*

Local Arrangement Chair:
Sergio Pacheco, *Freescale Semiconductor*

Publications Chair:
William Chappell, *Purdue University*

Student Paper Competition Co-Chairs:
Donald Y.C. Lie, *Texas Tech. University*
Yu-Ting Cheng, *National Chiao Tung University*

Executive Committee:
John D. Cressler, *Georgia Tech*
Rhonda Drayton, *University of Minnesota*
Basanth Jagannathan, *IBM Corporation*
Erich Kasper,*University of Stuttgart*
Rudolf Lachner, *Infineon Technologies AG*
Liang-Hung Lu, *Nat'l Taiwan University*
Zhenqiang (Jack) Ma, *University of Wisconsin-Madison*
Guofu Niu, *Auburn University*
Sergio Pacheco, *Freescale Semiconductor*
Dimitrios Peroulis, *Purdue University*
Robert Plana, *LAAS-CNRS*
George Ponchak, *NASA Glenn Research Center*
Jae-Sung Rieh, *Korea University*
Clemens Ruppel, *EPCOS AG*
Katsuyoshi Washio, *Hitachi Ltd*
Robert Weigel, *University of Erlangen*

Message from the Chair: Zhenqiang (Jack) Ma

Si-based RF technologies have experienced a dramatic revolution over the past two decades with applications penetrating in many areas where Si was considered impossible. The 8th Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems (SiRF'08) to be held in Orlando, FL during January 23-25, 2008 will continue its excellent single session tradition and serve as the unique conference that covers the full range of topics related to Si-based RF. These Si RF topics to be covered include materials, passives, MEMS, active devices, integrated circuits at all RF frequencies, all applications and emerging Si RF technologies at all levels. Over the three days of conference, about 12 technical sessions including one interactive poster session will be held to provide a forum for presenting the latest advances in these areas. World-renowned technical leaders in their respective areas will give invited talks in each of the sessions. New to this year's program is that a joint session will be held together with RWS for broader interactions. While receiving paper submissions from all over the world each year, we are proud of our popularity among student researchers. This year's Best Student Paper Competition will again be featured with student presentations and extensive interactions with a team of judges during the poster session. Four winners with great gift prizes will be announced and conferred during the conference banquet to be held on Thursday evening, January 24, 2008.

Our focused single-session format will allow attendants to fully exchange their ideas in the easiest way possible. With the passport registration, you will be able to sit in this conference without separately paying its registration fee. Our conference reception/banquet will warmly provide you a very pleasant social environment for comfortable interactions. I look forward to your attendance in this once-in-a-year exciting event.

Hope to see you at SiRF'08 in Orlando!

SiRF'08 Invited Speakers:

Narayan Aluru, *University of Illinois-Urbana Champaign*, **NEMS Modeling**

Garry Fedder, *Carnegie Mellon University,* **CMOS/MEMS**

Donhee Ham, *Harvard University,* **RF Design**

Daeik Kim, *IBM*, **Processing**

Andreas Mueller, *Bosch*, **122 GHz SIMMWIC Circuits**

Kenneth O, *University of Florida*, **RF CMOS**

Kaushik Roy, *Purdue University*, **CMOS Leakage**

Huei Wang, *Taiwan National University*, **RFIC Design**

John Wood, *Freescale Semiconductor,* **Compact Modeling of Power Devices**

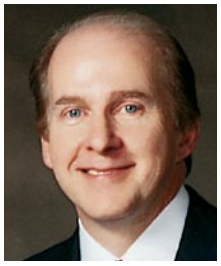
For further information, visit the SiRF08 website at
http://www.eng.auburn.edu/~niuguof/sirf/

Plenary Session

Tuesday, January 22, 2008
Co-Chairs:
Arye Rosen, *Drexel University*
Mohammad Madihian, *NEC Corporation of America*

The Plenary session officially opens the 2008 Radio and Wireless Symposium. All technical and exhibitor registrants for any of the week's events are welcome to attend. The featured Plenary speaker is Jerry D. Neal, speaking on the topic of "100 Years of Wireless Technology."

8:00 AM **Opening Remarks**
Aly Fathy, *General Chairman, 2008 Radio and Wireless Symposium*
8:30 AM **Welcome Addresses**
Doug Zuckerman, *President, IEEE Communications Society*
Jozef Modelski, *President, IEEE Microwave Theory & Techniques Society*
8:45 AM **Technical Program Overview**
Afshin Daryoush, *Technical Program Chair, 2008 Radio and Wireless Symposium*
9:05 AM **Featured Plenary Talk:** "100 Years of Wireless Technology"
Jerry Neal, *RF Micro Devices, Inc., Greensboro, NC , USA*
9:50 AM **Concluding Remarks**



Jerry D. Neal, the Co-Founder and Executive Vice President of Strategic Development for RFMD, has over 30 years experience in the RF and wireless communications industry. Mr. Neal received his ASEE degree from Gaston Technical Institute and North Carolina State University. In 2001 he was awarded the Doctor of Business Management Degree from Southern Wesleyan University.

Before co-founding RFMD, he broadened his knowledge of sales and technical business with 10 years experience in various marketing positions at Analog Devices, Inc.

As a co-founder of RFMD, Mr. Neal took primary responsibility for securing the initial funding for the new venture. Mr. Neal established the image of RFMD in the marketplace and was primarily responsible for many of the key relationships.

He has authored two books, Fire in the Belly, and Built on a Rock, a Memoir of Family, Faith and Place. Fire in the Belly chronicles the unique story of RFMD - its inception and explosive growth throughout the past decade. Built on a Rock, a Memoir of Family Faith and Place, is a poignant story of the influence that family and faith have had on Mr. Neal's life.

Social Events

Complimentary Daily Breakfast
Place: Rosen Center
Time: 7:00 AM–8:00 AM

Buffet Daily Lunch
Place: Rosen Center
Time: 12:30 PM–1:30 PM, TUE.-THURS.

Complimentary Daily Coffee Breaks
Place: Rosen Center
Time: 10:00 AM–10:30 AM and 3:30 PM–4:00 PM
TUES-THURS

RWS Reception and Banquet
Place: Rosen Center
Time: 6:00 PM–9:00 PM,
Wednesday, 23 January, 2008
Price: $40
$45 Onsite

Invited Session

Session: TU2A

Invited Paper Session on Wireless Communications
Chair: Afshin Daryoush, *Drexel University*
Co-Chair: Abbas Jamalipour, *University of Sydney*

TU2A-1 – 10:30 AM
Cross-layer Design of Wireless Mesh Networks with Network Coding
Xiaodong Wang, Columbia University, *New York, United States*

TU2A-2 – 11:00 AM
The Software Defined Radio: Fact and Fiction
Alan Tribble, *Rockwell Collins, Government Systems, Cedar Rapids, IA, USA*

TU2A-3 – 11:30 AM
Dynamic Noise Feedback and Mode-coupling Mechanism Silences the Oscillator Phase Noise
Ulrich L. Rohde , *Synergy Microwave Corp., Paterson, United States*

TU2A-4 – 12:00 PM
Measurement Techniques for Characterizing Platform Interference Issues
Kevin P Slattery, *Intel Corp, United States*

The exhibition area is open from 12:30pm until 7:30pm on Tuesday, 22 January and 9:00am-5:00pm on Wednesday 23 January. A Welcome Reception sponsored by Agilent Technologies will take place on Tuesday evening from 5:30pm – 7:30pm. Visit the exhibitors for the latest information on wireless technologies!

RUMP SESSION

TEST TOOLS FOR THE DEVELOPMENT & CHARACTERIZATION OF WIRELESS POWER AMPLIFIERS
Tuesday, January 22, 2008, 7 PM - 8 PM
Speaker: Pieter Seidel, *Tektronix, Inc.*

Spectral RF distortions from power amplifiers can now be controlled in real-time using digital control loops with much higher spectrum performance and efficiency compared to analog techniques. Cost advantages and manufacturing efficiency have been gained by pushing digital circuitry as far up the RF chain as technology will allow. Yesterday's narrow band, single-carrier, triple conversion systems are being replaced with wide band, multi-carrier transmitters enabled by digital signal processing (DSP) and DACs that produce direct IF, or even direct RF outputs to the RF amplifier. And waveforms are now digitally pre-distorted for maximum efficiency and tight spectrum control.

These innovative RF systems and techniques create new challenges for the design engineers and system operators who must troubleshoot and characterize them. Troubleshooting an RF design now requires the ability to trace a signal from a DSP-generated base-band to a wide-band digitally modulated RF output. These digitally generated RF signals create new, transient faults that are difficult to discover, trigger on and measure.

This presentation examines the characteristics of modern RF systems and demonstrates the use of the Tektronix RSA6100A Series of Real-Time Spectrum Analyzers (RTSAs) for troubleshooting and characterizing performance. We will cover basic vector and spectrum measurements, characterizing wide band Digital Pre-Distortion systems and troubleshooting high-bandwidth systems.

Who should attend? Wireless devices off all types (handset, base station, broadcast, and Radar) are migrating to adaptive linearization technologies. Technology experts, research, design, and test engineers who are required to design, debug, and characterize wireless power amplifier devices will benefit from this seminar. Learn about the new instrument and measurement solutions that are available to simplify your measurement and design challenges.

TUESDAY, JANUARY 22, 2008

Session: TU3A

OFDM

Chair: Narayan Prasad, *NEC America*

Co-Chair: Husheng Li, *Qualcomm*

TU3A-1 – 1:30 PM

Interference Mitigation for Coded MB-OFDM UWB

C. Snow, L. Lampe, R. Schober, *University of British Columbia, Vancouver, Canada*

TU3A-2 – 2:00 PM

Concurrent PAR and Power Amplifier Adaptation for Power Efficient Operation of WiMAX OFDM Transmitters

S. Sen, R. Senguttuvan, A. Chatterjee, *Georgia Institute of Technoilogy, Atlanta, United States*

TU3A-3 – 2:20 PM

Complexity Reduction of Adaptive T-algorithm on UWB OFDM Systems

J. An, E.L. Hines, M.S. Leeson, L. Sun, W. Ren, D.D. Iliescu, *University of Warwick, Coventry, UK*

TU3A-4 – 2:40 PM

Joint Carrier and Sampling Frequency Offset Estimation for MB-OFDM UWB System

K. Png, X. Peng, S. Chattong, H. T. Francis, F. Chin, *Institute for Infocomm Research, Singapore, Singapore*

TU3A-5 – 3:00 PM

Peak to Average Power Ratio Reduction Technique for OFDM Using Pilot Tones and Unused Carriers

C. Devlin, A. Zhu, T. Brazil, *University College Dublin, Dublin, Ireland*

TU3A-6 – 3:20 PM

Simple Series Form Formula of BER Performance for DQPSK/OFDM Signals in Comprehensive Nonlinear Fading Channels

F. Maehara, A. Taira, *Waseda University, Shinjuku-ku, Japan*

Session: TU3B

Advances in RF Tront-end Technologies

Chair: Xiangdong Zhang, *Qualcomm*

Co-Chair: Xinwei Wang, *Qualcomm*

TU3B-1 – 1:30 PM

A 1.2V Inductorless Receiver Front-End for Multi-Standard Wireless Applications

M. Vidojkovic[1], V. Vidojkovic[2], M. A. Sanduleanu[2], J. van der Tang[3], P. Baltus[1], A. van Roermund[1], *[1]Eindhoven Univ. of Tech., [2]Philips Research, [3]Holst Center/IMEC-NL, Eindhoven, Netherlands*

TU3B-2 – 1:50 PM

A Low Additive Noise Interference Canceller for High Sensitivity Applications

A. Raghavan[1], S. Chandramouli[1], E. Gebara[2,1], J. Laskar[1,2], *[1]Georgia Inst. of Tech., Atlanta, U.S., [2]Quellan Inc., Atlanta, U.S.*

TU3B-3 – 2:10 PM

DC-Offset Compensation of a 77GHz Monostatic FMCW-Radar Transceiver for Automotive Application

O. Günther[1], D. Steinbuch[2], O. Brüggemann[3], H. Jäger[3], R. Weigel[1], *[1]Friedrich-Alexander-Univ. Erlangen, Germany, [2]Robert Bosch GmbH, Leonberg, Germany, [3]Danube Integr. Circuit Eng., Linz, Austria*

TU3B-4 – 2:30 PM

0.11µm CMOS DBS Demodulator Front-end Using a 250MS/s 8 bit Time Interleaved Pipeline ADC and a Sampled Loop Filter PLL

A. Maxim, R. Poorfard, *Silicon Laboratories, Austin, United States*

TU3B-5 – 2:50 PM

A Direct Down-Conversion Receiver for Coherent Extraction of Digital Baseband Signals Using the Injection Locked Oscillators

M. A. Tarar, Z. Chen, *Dalhousie University, Halifax, Canada*

TU3B-6 – 3:00 PM

Robust Design of Deep Sub-micron CMOS Wireless SoC

M. Hamada, N. Itoh, *TOSHIBA Corporation, Yokohama, Japan*

Session: TU3C

Advancements in Basestation Power Amplifier Techniques

Chair: Hiroshi Kondoh, *Hitachi, Central Research Lab.*

Co-Chair: Simon Wood, *Cree Inc.*

TU3C-1 – 1:30 PM

High-Power and High-Efficiency GaN HEMT Amplifiers

K. Joshin, T. Kikkawa, *Fujitsu Limited, Atsugi, Japan*

TU3C-2 – 2:00 PM

Status and Trends of Silicon LDMOS Base Station PA Technologies to go Beyond 2.5 GHz Applications

F. van Rijs, *NXP Semiconductors, Nijmegen, Netherlands*

TU3C-3 – 2:30 PM

Highly Linear and Efficient Doherty Amplifier Employing Power Tracking Bias Supply Scheme for WCDMA Applications

Y. Lee, M. Lee, Y. Jeong, *Pohang University of Science and Technology (POSTECH), Pohang, Republic of Korea*

TU3C-4 – 2:50 PM

A X-band 250W Solid-State Power Amplifier using GaN Power HEMTs

K. Kanto, A. Satomi, Y. Asahi, Y. Kashiwabara, K. Matsushita, K. Takagi, *Toshiba Corporation, Kawasaki, Japan*

TU3C-5 – 3:10 PM

Optimization of Broadband Drain Modulation in GaN HEMT Devices

R. S. Embar, R. Ma, A. Z. Markos, G. Kompa, *University of Kassel, Kassel, Germany*

Session: TU4A

Wireless Communication Systems

Chair: Alexi Ashikhmin, *Alcatel-Lucent*

Co-Chair: Devereux Palmer, *US Army Research Office*

TU4A-1 – 4:00 PM

Optimal Selection of Wireless Channels for Real-time Communication in Ambulances

G. Sahai, A. E. Goulart, W. Zhan, R. Arnold, *Texas A&M University, College Station, United States*

TU4A-2 – 4:20 PM

Mitigation of Scintillation Using Antenna Receive Diversity for Ka Band Satellite Signals

S. Enserink, M. P. Fitz, *University of California at Los Angeles, Los Angeles, United States*

TU4A-3 – 4:40 PM

Two Maximum Energy Selection Combining Schemes for "M"-ary NCFSK in Rician Fading

Y. Kim[1], N. C. Beaulieu[2], *[1]University of Seoul, Seoul, Republic of Korea, [2]University of Alberta, Edmonton, Canada*

TU4A-4 – 5:00 PM

Application of Extreme Value Distribution to Model Propagation Fading in Indoor Mobile Radio Environments

M. Molina-García[1], A. Fernandez-Durán[2], J. Alonso[1], *[1]Polytechnical University of Madrid, Madrid, Spain, [2]Alcatel-Lucent, Madrid, Spain*

TU4A-5 – 5:20 PM

A Fading Channel Simulator Based on a Modified Karhunen-Loève Expansion

A. Petrolino[1], J. Gomes[1], G. Tavares[2,1], *[1]Instituto de Engenharia de Sistemas e Computadores Investigação e Desenvolvimento em Lisboa (INESC-ID), Lisbon, Portugal, [2]Instituto Superior Técnico (IST), Lisbon, Portugal*

Session: TU4B

Software Defined and Cognitive Radios

Chair: Gamal Hegazi, *Rockwell Collins*

Co-Chair: Robert Walters, *Defence Academy of UK*

TU4B-1 – 4:00 PM

Cognitive Interference-Mitigation Technique for Hybrid DS-Multiband-UWB Multiple Access System

C. Sum[1], M. Rahman[2], S. Sasaki[2], H. Harada[1], S. Kato[1], *[1]National Institute of Information and Communications Technology, Yokosuka, Japan, [2]Niigata University, Niigata, Japan*

TU4B-2 – 4:20 PM

Frequency Agile RF Feedforward Noise Cancellation System

A. Roussel[1], C. W. Nicholls[2], J. S. Wight[1], *[1]Carleton University, Ottawa, Canada, [2]Nortel, Ottawa, Canada*

TU4B-3– 4:40 PM

Spectrum Shaping of OFDM-based Cognitive Radio Signals

H. A. Mahmoud, H. Arslan, *University of South Florida, Tampa, United States*

TU4B-4– 5:00 PM

A Self-Calibrating Quadrature Mixing Front-End for SDR

J. J. de Witt, G. van Rooyen, *Stellenbosch University, Stellenbosch, South Africa*

TU4B-5– 5:10 PM

Multiuser Diversity and Adaptive Bit Loading for OFDM based Spectrum Agile Radios (SAR)

P. Yaddanapudi[1], R. Gvs[1], D. Popescu[2], *[1]University of San Antonio at Texas, San Antonio, United States, [2]Old Dominion University, Norfolk, United States*

Session: TU4C

Optical Techniques for Wireless Communications

Chair: Yves Baeyens, *Alcatel-Lucent*

Co-Chair: Thas A Nirmalathas, *University of Melbourne*

TU4C-1 – 4:00 PM

High-Performance Microwave-Photonic Links

T. E. Darcie, J. Zhang, *University of Victoria, Victoria, Canada*

TU4C-2 – 4:30 PM

Ultra-Wideband Gaussian Monocycle and Doublet Pulse Generation using a Photonic Microwave Delay-line Filter

Q. Wang, J. Yao, *University of Ottawa, Ottawa, Canada*

TU4C-3– 4:50 PM

Performance Analysis of 802.11e Transmission Bursting in Fiber-fed Networks

M. Mjeku, N. J. Gomes, *University of Kent, Canterbury, United Kingdom*

TU4C-4– 5:00 PM

Radio over Fiber: DWDM-Based Analog/Digital Access Networking and Its Enabling Technologies

T. Kuri[1], H. Toda[2], and K.I. Kitayama[3], *[1]NICT, [2]Doshisha University, [3]Osaka University, Japan*

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WEDNESDAY, JANUARY 23, 2008

Session: WE1A

Wireless System Architectures and Components
Chair: Murat Uysal, *University of Waterloo*
Co-Chair: Husheng Li, *Qualcomm*

WE1A-1 – 8:00 AM
Architectures and Components for Multifunctional Wireless Systems
W. D. Palmer, *US Army Research Office, Research Triangle Park, United States*

WE1A-2 – 8:30 AM
Experimental Performance Evaluation of Error Estimation and Compensation Technique for Quadrature Modulators and Demodulators
A. Yamaoka, K. Yamaguchi, I. Seto, *TOSHIBA Corporation, Kawasaki, Japan*

WE1A-3 – 8:50 AM
A Fully Digital Architecture for Wideband Wireless Transmitters
V. K. Parikh[1], P. T. Balsara1, O. E. Eliezer[2], *[1]Univ. of Texas at Dallas, Richardson, USA, [2]Texas Instruments Inc., Dallas,USA*

WE1A-4 – 9:10 AM
Six-Port Receiver Local Oscillator Power Selection for Maximum Output SNR
S. M. Winter, A. Koelpin, H. J. Ehm, R. Weigel, *University of Erlangen-Nuremberg, Erlangen, Germany*

WE1A-5 – 9:30 AM
Least Square Based Piecewise Parabolic Interpolation for Timing Synchronization
R. Pulikkoonattu, H. K. Subramanian, S. Laxman, *Genesis Microchip, Bangalore, India*

WE1A-6 – 9:40 AM
Specification of a Polar Sigma Delta Architecture for Mobile Multi-Radio Transmitter - Validation on IEEE 802.16e
L. A. Andia Montes[2,1], M. L. Suarez Peñaloza[1], G. Baudoin[1], M. Villegas[1], *[1]ESIEE, Noisy-Le-Grand, France, [2]STMicroelectronics, Crolles, France*

Session: WE1B

Novel Signal Generation Techniques and Applications
Chair: Herbert Zirath, *Chalmers Univ. of Technology*
Co-Chair: Emery Chen, *National Taiwan University*

WE1B-1 – 8:00 AM
A 6ps Resolution Pulse Shrinking Time-to-Digital Converter as Phase Detector in Multi-Mode Transceiver
Y. Liu[1], U. Vollenbruch[2], Y. Chen[2], C. Wicpalek[3], Z. Boos[4], L. Maurer[5], R. Weigel[6], *[1]Johannes Kepler Linz Univ., [2]Mechtronic Center of Linz, [3]Johannes Kepler Linz Univ., Linz, Austria, [4]Infineon Tech. AG, Munich, Germany, [5]DICE GmbH, Linz, Austria, [6]Erlangen Nuernberg Univ., Erlangen, Germany*

WE1B-2 – 8:20 AM
A 1V CMOS Quadrature LC VCO Using Diode Coupling
T. T. Chan, H. C. Luong, *The Hong Kong University of Science and Technology, Tsuen Wan, Hong Kong*

WE1B-3 – 8:50 AM
A Varying Pulse Width 5th-Derivative Gaussian Pulse Generator for UWB Transceivers in CMOS
H. Xie[1], X. Wang[1], A. Wang[1], B. Zhao[2], Y. Zhou[3], B. Qin[4], H. Chen[4], Z. Wang[4], *[1]Illinois Inst. of Tech., Chicago, USA, [2]Freescale Semiconductor, Inc, Irvine, USA, [3]CAS, Beijing, China, [4]Tsinghua Univ., Beijing, China*

WE1B-4 – 9:10 AM
Phase Noise in CMOS Saturated Ring Oscillators based on Time Scaling with Random Mid Point Voltage
B. Leung, *University of Waterloo, Waterloo, Canada*

WE1B-5 – 9:30 AM
A 43GHz 0.13um CMOS Prescaler
T. Luo, S. Bai, Y. E. Chen, *National Taiwan University, Taipei, Taiwan*

WE1B-6 – 9:40 AM
Future Trends in Broadcast Receiver Integration: SoC versus SiP
A. Maxim, *Silicon Laboratories, Austin, United States*

Session: WE1C

Recent Technologies for Terminal Power Amplifiers
Chair: Jan-Erik Mueller, *Infineon Technologies*
Co-Chair: Fadhel Ghannouchi, *University of Calgary*

WE1C-1 – 8:00 AM
GaAs Technology Status and Perspectives for Multi-band and Multi-standard Challenges in Upcoming RF-Frontends
P. J. Zampardi, *Skyworks Solutions, Newbury Park, United States*

WE1C-2 – 8:30 AM
Silicon Technology Status and Perspectives for Multi-band and Multi-standard Challenges in Upcoming RF-Frontends
D. W. Nobbe, *Peregrine Semiconductor, Palatine, United States*

WE1C-3 – 9:00 AM
Process- and Technology-Independent Power Switching Transistor Figures of Merit
E. McCune, *Panasonic, Santa Clara, United States*

WE1C-4 – 9:20 AM
A High-Efficiency Linear Polar Transmitter for EDGE
N. D. Lopez, X. Jiang, D. Maksimovic, Z. Popovic, *University of Colorado, Boulder, United States*

WE1C-5 – 9:40 AM
A Load-Insensitive Quad-Band GSM/EDGE SiGeC-Bipolar Power Amplifier with a Highly Efficient Low Power Mode
W. Bakalski, M. Zannoth, M. Asam, W. Thomann, B. Kapfelsperger, P. Pfann, J. Berkner, C. Hepp, A. Steltenpohl, W. Oesterreicher, E. Rampf, *Infineon Technologies AG, Neubiberg, Germany*

Session: WE3A

Iterative Receivers and Adaptive Systems
Chair: Xingang Guo, *Intel Corp.*
Co-Chair: Gianfranco Manes, *UNIFI, Italy*

WE3A-1 – 1:30 PM
A BICM-IDD Scheme for Non-Coherent MIMO Communication
R. H. Gohary, M. A. El-Azizy, T. N. Davidson, *McMaster University, Hamilton, Canada*

WE3A-2 – 2:00 PM
Adaptive Filtering using LMS for Digital TX IM2 Cancellation in WCDMA Receiver
M. Kahrizi, J. Komaili, J. E. Vasa, D. Agahi, *Skyworks Solution Inc, Irvine, United States*

WE3A-3 – 2:20 PM
Interference Multiple Access: Real-time Multi-User Detection for Infrastructure-free Wireless Communication Networks
R. Learned[1], B. Hombs[1], M. Lande[1], J. Tranquilli[1], L. Russo[1], J. Farkas[1], J. Niedzweicki[1], Y. Eisenberg[1], L. R. Brothers[2], *[1]BAE Systems, Nashua, USA, [2]DARPA, Arlington, USA*

WE3A-4 – 2:30 PM
Novel Conjugate-Gradient Based Complex Adaptive ICA for Diversity QPSK Receivers in Time-Varying Channel Applications
W. Mikhael[1], R. Ranganathan[1], T. Yang[2], *[1]Univ. of Central Florida, Orlando, USA, [2]Embry-Riddle Aeronautical Univ., Daytona Beach, USA*

WE3A-5 – 2:50 PM
Adaptive Transmission in a Realistic Multicell Scenario
L. Thiele, V. Jungnickel, *Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut, Berlin, Germany*

WE3A-6 – 3:10 PM
Turbo Decoding with Integrated Fading Compensation
Y. Zhou, B. Shahrrava, *University of Windsor, Windsor, Canada*

Session: WE3B

Hardware Challenges in the Wireless Communications
Chair: Afshin S. Daryoush, *Drexel University*
Co-Chair: Aly Fathy, *University of Tennesse, Knoxville*

WE3B-1 – 1:30 PM
Status and Prospects of High Power RF Tube Amplifier Devices
B. Levush, *Naval Research Laboratory, Washington DC, United States*

WE3B-2 – 2:00 PM
Adaptive Channel Characterization for Wireless Communication
Abbas Omar, *University of Magdelburg, Magdelburg, Germany*

WE3B-3– 2:30 PM
Challenges in Integrating Embedded RF within a SOC
T. J. Ridgers[1], C. B. Boucey[1], J. Frambach[2], L. Rolland du Roscoat[1], P. Gamand[1], *[1]NXP Semiconductors, Colombelles, France, [2]NXP Semiconductors, Nijmegen, Netherlands*

WE3B-4– 3:00 PM
Analog RF Performance of a CMOS Optical Filter
K. Y. Tu[1], M. S. Rasras[1], Y. K. Chen[1], S. S. Patel[1], D. M. Gill[1], A. E. White[1], D. Carothers[2], A. Pomerene[2], J. Beattie[2], M. Beals[3], J. Mitchel[3], J. Liu[3], L. C. Kimerling[3], *[1]Alcatel-Lucent, Murray Hill, USA, [2] BAE Systems, Arlington, United States, [3]Massachusetts Institute of Technology, Cambridge, USA*

Session: WE3C

MIMO/Space-Time Transceiver Design and Analysis
Chair: Qinghua Li, *Intel Corporation*
Co-Chair: Vijay Nair, *Intel Corporation*

WE3C-1 – 1:30 PM
Recursive Covariance Design for Multiple Antenna Physical Layer Multicasting
I. Kim[1], D. Love[1], S. Y. Park[2], *[1]Purdue University, West Lafayette, United States, [2]Kangwon National University, Chuncheon, Republic of Korea*

WE3C-2 – 2:00 PM
Distributed Space--Time Block Codes with Amicable Orthogonal Designs
T. Q. Duong[1], H. Tran[2], *[1]Kyung Hee Univ., Yongin, Republic of Korea, [2]Ho Chi Minh City Univ. of Transport, Ho Chi Minh City, Viet Nam*

WE3C-3 – 2:20 PM
Reconfigurable Antennas for MIMO Ad-Hoc Networks
J. Kountouriotis[1], D. Piazza[1,2], P. Mookiah[1], M. D'Amico[2], K. R. Dandekar[1], *[1]Drexel University, Philadelphia, United States, [2]Politecnico di Milano, Milano, Italy*

WE3C-4 – 2:40 PM
A New Super-Orthogonal Space-Time Block Code
S. Ma, *National Taipei University of Technology, Taipei, Taiwan*

WE3C-5 – 3:00 PM
Approximate Average Eigenvalues of a Random Matrix and Their Application to LMMSE Receiver Analysis
H. Shekhar, *ArrayComm, San Jose, United States*

WE3C-6 – 3:20 PM
Multiple-Input Multiple-Output Rayleigh Flat Fading Outage Capacity Using Channel Estimation
C. G. Potter[1], K. Kosbar[1], A. Panagos[2], *[1]University of Missouri-Rolla, Rolla, United States, [2]Dynetics, Huntsville, United States*

WEDNESDAY, JANUARY 23, 2008

Session: WE4A

Wireless Local Area Networks
Chair: Cyril Iskander, *The MathWorks Inc.*
Co-Chair: Narayan Prasad, *NEC America*

WE4A-1 – 4:00 PM
Performance Enhancement of TCP over Adaptive Multi-Rate IEEE 802.11 Wireless LANs
K. Kashibuchi[1], T. Taleb[1], A. Jamalipour[2], Y. Nemoto[1], N. Kato[1], *[1]Tohoku University, Sendai, Japan, [2]University of Sydney, Sydney, Australia*

WE4A-2 – 4:20 PM
Traffic Control for Communications using Multiple IEEE802.11 Wireless Interfaces
Y. Takizawa, *Advanced Telecommunications Research Institute International, 2-2-2 Hikaridai Keihanna Science City, Japan*

WE4A-3 – 4:40 PM
Utility-Based Load Balancing in WLAN/UMTS Internetworking Systems
Y. Zhou[1], Y. Rong[1], H. Choi[1], J. Kim[2], J. Sohn[3], H. Choi[3], *[1]The George Washington University, Washington, United States, [2]SK Telecom, Seoul, Republic of Korea, [3]Seoul National University, Seoul, Republic of Korea*

WE4A-4 – 5:00 PM
Adjacent Channel Interference in 802.11a: Modeling and Testbed Validation
V. Angelakis[1,2], S. Papadakis[1,2], V. Siris[1,2], A. Traganitis[1,2], *[1]Foundation of Reseach and Technology -Hellas, Institute of Computer Science, Heraklion, Greece, [2]University of Crete, Heraklion, Greece*

WE4A-5 – 5:20 PM
Asymmetric Pulse Width Modulated Envelope Signal in an EER Architecture for WLAN
J. B. Mártires[1,2], S. B. Christensen[1], T. Larsen[2], *[1]Motorola A/S, Nørresundby, Denmark, [2]Aalborg University, Aalborg East, Denmark*

Session: WE4B

Fading, Diversity, and Channel Modeling
Chair: Xun Gong, *Univ. of Central Florida*
Co-Chair: Hiroshi Shirai, *CHUO University, Tokyo*

WE4B-1 – 4:00 PM
Simple Accurate Closed-Form Approximations for the Crossing Rates of Weibull Fading Channels in Multibranch Diversity Systems
D. B. da Costa, M. D. Yacoub, J. S. Santos Filho , *State University of Campinas, Campinas, Brazil*

WE4B-2 – 4:20 PM
NLOS Path Loss Evaluation for Street-Cell Environment
A. Amornthipparat[1], H. Shirai[1], Y. Kenya[2], T. Inoue[2], *[1]Chuo University, 1-13-27 Bunkyo-ku, Japan, [2]KDDI R&D Laboratories Inc., 7-1 Hikarinooka, Yokosuka, Japan*

WE4B-3 – 4:30 PM
Empirical Capacity and the Fading Characteristics of Ultra-Wideband Indoor Propagation Channels
U. J. Mönich[1], C. Sturm[2], H. Boche[1], W. Wiesbeck[2], *[1]Technische Universität Berlin, Berlin, Germany, [2]Universität Karlsruhe (TH), Karlsruhe, Germany*

WE4B-4 – 4:50 PM
Fading Characterization in a Semi-anechoic Chamber with Artificial Scatterers for Mean Effective Gain Measurements of Wireless Handheld Terminals
A. Alayón-Glazunov[1], A. F. Molisch[1,2], F. Tufvesson[1], *[1]Lund University, Lund, Sweden, [2]Mitsubishi Electric Research Labs, Cambridge, United States*

WE4B-5 – 5:10 PM
RMS Delay Spread vs. Mean-Square Path Gain for Characterization of Channel Capacity
Y. Y. Kang, S. H. Mo, J. H. Cho, *Pohang University of Science and Technology, Pohang, Republic of Korea*

Session: WE4C

Implementation and Evaluation of Smart Antenna
Chair: David Love, *Purdue University*
Co-Chair: Christopher C. Yu, *Draper Corp.*

WE4C-1 – 4:00 PM
Field Data Showing the Downlink Adaptive Beamforming Gains for an Experimental IEEE 802.16e-2005 OFDMA System
V. Desai, J. F. Kepler, F. W. Vook, *Motorola, Schaumburg, United States*

WE4C-2 – 4:20 PM
Dependence of Peak Power Measurement of Ultra Wideband Signalson Impulse Bandwidths of Spectrum Analyzers
K. Koizumi, T. Kobayashi, *Tokyo Denki University, Kandanishiki-cho 2-2, Japan*

WE4C-3 – 4:40 PM
A Novel Branch-and-Bound Based Maximum-Likelihood MIMO Detection Algorithm
M. Chang, C. Lai, *National Cheng Kung University, Tainan, Taiwan*

WE4C-4 – 5:00 PM
An Undersampling Retrodirective Antenna Array System
J. Sun[1], X. Zeng[2], Z. D. Chen[3], *[1]Moog Components Group (Focal Technologies), Dartmouth, Canada, [2]Microchip Technology Inc., Chandler, United States, [3]Dalhousie University, Halifax, Canada*

WE4C-5 – 5:20 PM
Dynamic Radiation Pattern Diversity (DRPD) MIMO Using CRLH Leaky-Wave Antennas
J. Frigon, C. Caloz, Y. Zhao, *École Polytechnique de Montréal, Montréal, Canada*

Session P1 (Interactive Poster Presentation) 10:30 AM to 12:30 PM

Chair: Jenshan Lin, *University of Florida*
Co-Chair: Clemens Ruppel, *EPCOS AG, Munich*

Join us Wednesday from 10:30 AM to 12:30 PM for the Poster Session to be held in the Junior Ballroom F. The Poster Session provides an opportunity for the presenter to engage in discussion with small groups of interested viewers. Its location in the exhibit hall will encourage a broad audience and interest from exhibitors. Food and beverage will also be available in close proximity. Be prepared to answer specific questions and to address details of your work. Software or hardware demonstrations are welcomed and encouraged. Floor is open to authors from 9:30 AM to 10:30 AM for setup and closes promptly at 12:30 PM. Detailed author instructions are available at http://rawcon.org/rws2008/posterguide.html.Poster Session Chair: Jenshan Lin, University of Florida, email: jenshan@ieee.org Poster Session Co-Chair: Clemens Ruppel, EPCOS AG, Munich, email: clemens.ruppel@epcos.com

P1-1
Comparison b/w the IEEE 802.11x Standards of VoIP Using the CBR and VBR Voice Schemes
M. I. Anis, M. Z. Khan, J. Inam, *Sir Syed University of Engineering and Technology, Karachi, Pakistan*

P1-2
Simulation based Algorithm Comparison for Planning and Optimization of Indoor Wireless Networks
S. Nistal-Ariza[1], A. Fernández-Durán[2], J. I. Alonso[3,4], *[1]Universidad Politécnica de Madrid, Madrid, Spain, [2]Alcatel-Lucent, Madrid, Spain, [3]Universidad Politécnica de Madrid, Madrid, Spain, [4]IEEE, Madrid, Spain*

P1-3
On the Use of LMMSE Receiver for Single and Multiple Packet Reception in Stabilized Multi-channel Slotted Aloha
H. Shekhar, *ArrayComm, San Jose, United States*

P1-4
Relaying and Diversity
R. Raulefs, *DLR e.V., Wessling, Germany*

P1-5
The Impact of Application Layer Raptor FEC on the Coverage of MBMS
N. Wang[1,2], Y. Wang[1,2], *[1]Alcatel-Shanghai Bell Co., Ltd., Shanghai, China, [2]Alcatel-Shanghai Bell Co., Ltd., Shanghai, China*

P1-6
A Secure and Efficient Satellite-based Multicast Architecture
V. P. Hubenko, Jr, R. A. Raines, R. O. Baldwin, B. E. Mullins, R. F. Mills, M. R. Grimaila, *U.S. Air Force Institute of Technology, Wright Patterson AFB, United States*

P1-7
Real Time Software GPS Receiver with New Fast Tracking Method
R. Yadav, N. Sonowal, *Centre for air-borne systems, Bangalore, India*

P1-8
An Energy Efficient Distributed Clustering Approach with Assistant Nodes in Wireless Sensor
M. Yeo[1], Y. Kim[2], J. Yoo[1], *[1]Chungbuk National University, Cheongju, Republic of Korea, [2]Chungbuk National University, Cheongju, Republic of Korea*

P1-9
Energy Efficient MAC Protocols for Wireless Sensor Networks Endowed with Directive Antennas: a Cross-Layer Solution
G. Manes, R. Fantacci, F. Chiti, M. Ciabatti, G. Collodi, D. Di Palma, A. Manes, *University of Florence, Florence, Italy*

P1-10
Optimal Joint Radio Resource Management to Improve Connection-Level QoS in Next Generation Wireless Networks
O. E. Falowo, *University of Cape Town, Cape Town, South Africa*

P1-11
Application of System-level Design Flow to CWUSB MAC Architecture Enhancement
H. Kim, J. Lee, S. Oh, J. Park, S. Cho, G. Jeong, Y. Kim, B. Jeong, *Samsung Electronics, Co., Ltd., Youngin, Republic of Korea*

P1-12
Evaluation of Inter Base Station Handover For Cognitive Radio
M. Kataoka, T. Ishikawa, S. Hanaoka, M. Yano, S. Nishimura, *Hitachi, Ltd., Central Research Laboratory, 1-280, Higashi-koigakubo, Kokubunji-shi, Japan*

P1-13
Public-key Based Security Scheme for Wireless Sensor Network
J. Chen, Y. Lai, H. Lu, Q. Kuo, *National Dong Hwa University, Hualien, Taiwan*

P1-14
Performance Evaluation for WiMedia Ultra-Wideband Simultaneous Transmission with Wireless LAN over Cable and Fiber
Y. Guo, V. Pham, M. Yee, L. Ong, B. Luo, *Institute for Infocomm Research, Singapore, Singapore*

P1-15
Performance Enhancements of Ad Hoc Networks with Adaptive Monitor Based Routing
T. Dey, S. K. Mondal, M. Hashem, *Khulna University of Engineering and Technology (KUET), Khulna, Bangladesh*

P1-16
Study of Variable Channel Length for Single Carrier Transmission with Decision Feedback Equalizer
T. J. Khanzada, A. R. Ali, A. S. Omar, *University of Magdeburg, Magdeburg, Germany*

Session P1 (Interactive Poster Presentation)

10:30 AM to 12:30 PM
Chair: Jenshan Lin, *University of Florida*
Co-Chair: Clemens Ruppel, *EPCOS AG, Munich*

P1-17
Genetic Algorithm Based Multiuser Detection in Multi-Carrier DS-CDMA System
P. Chang, L. Ye, J. Chen, *National Dong Hwa University, Hualien, Taiwan*

P1-18
Performance Improvement of Downlink MC-CDMA Cellular System with an Intermittent Transmission
M. Fushiki[1], T. Yamazato[2], M. Katayama[2], *[1]Nagoya University, Nagoya, Japan, [2]Nagoya University, Nagoya, Japan*

P1-19
Smart antenna Beamforming Algorithm for Mobile Communications with High Speed Moving Sources
V. V. Zaharov, *Polytechnic University of Puerto Rico, San Juan, Puerto Rico*

P1-20
Structure and Implementation of a SIMO Multi-Standard Multi-channel SDR Receiver
P. Morlat, A. Luna, X. Gallon, G. Villemaud, J. Gorce, *CITI-INSA-Lyon, Villeurbanne, France*

P1-21
Avoidance of Adjacent Channel Crossed-Slot Interference
Y. Takanashi, Y. Horii, M. Nakagawa, *Keio University, Yokohama, Japan*

P1-22
Code-Shifted Reference Ultra-Wideband (UWB) Radio
H. Nie[1], Z. Chen[2], *[1]University of Northern Iowa, Cedar Falls, United States, [2]Dalhousie University, Halifax, Canada*

P1-23
Software Radio Performance Improvement through Combined RF and Digital Design
L. Pearson, J. B. Simoneau, *Clemson University, Clemson, United States*

P1-24
Antenna Diversity Impact to Indoor Wireless TOA-based Positioning Systems Accuracy
R. Szumny, K. Kurek, J. Modelski, *Warsaw University of Technology, Warsaw, Poland*

P1-25
A Novel MIMO STC-OFDM Technique with High Spectral Efficiency and High Performance
V. K. Jain, D. Divakaran, *University of South Florida, Tampa, United States*

P1-26
Parametric Modeling of Diverse Antennas designed for IR and MB-OFDM UWB Systems
Y. Duroc, T. Vuong, S. Tedjini, *Institut National Polytechnique de Grenoble (INPG), Valence, France*

P1-27
Wideband Space-Time Coded Systems with Noncolocated Antennas
H. Papadopoulos, C. W. Sundberg, *DoCoMo USA Labs, Palo Alto, United States*

P1-28
Spiral Antenna Irradiation into Lossy Media with Debye Dispersion
M. Tofighi, A. Sunal, *Penn State University, Capital College, Middletown, United States*

P1-29
A Generic Model for Classification of Radiation Emission data in Electromagnetic Compatibility Measurement
F. G. Awan, N. M. Sheikh, S. A. Qureshi, A. Ali, *University of Engineering and Technology Lahore, 54890 Pakistan, Lahore, Pakistan*

P1-30
A Novel Ray Tracing Acceleration Method Based On Bounding Volumes And Prior Environment Processing
N. Sedaghat Alvar, A. Ghorbani, H. Amindavar, *Amirkabir University of Technology, Tehran, Iran*

P1-31
Design of the Wideband Notched Compact UWB Antenna
C. Kim, J. Lim, J. Jang, H. Lee, M. Lee, *Gyeongsnag National University, Jinju, Republic of Korea*

P1-32
Spiral Coil Loaded Short Wire Antenna
J. Hao, *Badger Meter Inc., Milwaukee, United States*

P1-33
A Modified Small-Size Tapered Monopole Antenna for UWB Applications Designed by Genetic Algorithm
S. Radiom, H. Aliakbarian, G. Vandenbosch, G. Gielen, *Katholiek University of Leuven, Leuven, Belgium*

P1-34
A Mixed-Signal MIMO Beamforming Receiver
R. Tseng, A. S. Poon, Y. Chiu, *University of Illinois at Urbana-Champaign, Urbana, United States*

P1-35
Acoustic-RF Anechoic Chamber Construction and Evaluation
G. Garner, J. R. Wilkerson, M. M. Skeen, D. F. Patrick, R. D. Hodges, R. D. Schimizzi, S. R. Vora, Z. Feng, K. G. Gard, M. B. Steer, *North Carolina State University, Raleigh, United States*

P1-36
Electromagnetic Field Strength Assessment Errors in Flat Roof Vicinities
A. Bahillo[1,2], J. Blas[1,2], P. Fernández[2,1], R. M. Lorenzo[2,1], E. J. Abril[2], *[1]CEDETEL (Center for the Development of Telecommunications), Boecillo, Spain, [2]University of Valladolid, Valladolid, Spain*

P1-37
Modeling Wireless Propagation in a Rectangular Tunnel with the Compact-FDTD Method
M. F. Hadi, S. F. Mahmoud, *Kuwait University, Safat, Kuwait*

P1-38
Swarm-based Particle Filter for Flat Fading Channel Tracking
H. H. Hoang, B. W. Kwan, *Florida State University, Tallahassee, United States*

P1-39
Miniaturized-Element Frequency Selective Surfaces (MEFSS) Using Sub-Wavelength Periodic Structures
N. Behdad, *University of Central Florida, Orlando, United States*

P1-40
Analysis of Low Range Indoor Location Tracking Techniques using Passive UHF RFID Tags
A. Chattopadhyay, A. R. Harish, *Indian Institute of Technology, Kanpur, India*

P1-41
A WR6 Rectangular Waveguide to Microstrip Transition And Patch antenna at 140GHz Using Low-cost Solutions
P. Herrero, J. Schoebel, *Institute for High Frequency Technology, TU-Braunschweig, Braunschweig, Germany*

P1-42
Miniaturized RF Transformer-based Baluns for 802.11a/b/g WLAN Modules Embedded in organic Package Substrate
E. Davies-Venn, T. Kamgaing, *Intel Corporation, Chandler, United States*

STUDENT PAPER CONTEST

RWS 2008 will feature a Student Paper Contest with awards for first, second and third place. Take some time to view the student papers and support the young talent in the radio and wireless field. The official rules are posted on the Web at http://www.radiowireless.org/spc/StudentPaperContestRules.pdf

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CoChairs: Chris Yu, Qing Hua Li, David Love, Hakam Mheidat, Mohamed Moustafa, Vijay Nair, Kentaro Nishimori, Tomohiro Seki, Da-Shan Shiu, John Smee, Meritxell Lamorea

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CoChairs: Clemens Ruppel, Mehdi Shadaram, Paul Cotae, Jeff Frolik, Yao-win Hong, Mohammad Khojastehpour, Ryszard Lec, Phil Nobles, Sang Hyun Park, Hao Xin, Yi-cheng Lin

Wireless System Architectures, Modeling, and Adaptive Signal Processing
CoChairs: Narayan Prasad, Murat Uysal, David Akopian, Huseyin Arslan, Alexei Ashikhmin, Genevieve Baudoin, Chang-Ho Lee, Vivi Cojocaru, Xingang Guo, Husheng Li, Cyril Iskander, Gianfranceo Manes, Hong Jeffery Nie, W. Devereux Palmer, Kambiz Shoarinejad

Session P1 (Interactive Poster Presentation)

10:30 AM to 12:30 PM
Chair: Jenshan Lin, *University of Florida*
Co-Chair: Clemens Ruppel, *EPCOS AG, Munich*

P1-43
Stubs-Tuned Planar Coupled Resonators Based Spectral Pure Signal Source For Wireless Communication Systems
U. L. Rohde[1,2], A. K. Poddar[1], *[1]Synergy Microwave Corporation, Paterson, United States, [2]Brandenburg Univ. of Tech., Cottbus, Germany*

P1-44
Doppler Component Analysis of the Suburban Vehicle-to-Vehicle DSRC Propagation Channel at 5.9 GHz
L. Cheng[1], B. E. Henty[1], D. D. Stancil[1], F. Bai[2], *[1]Carnegie Mellon University, Pittsburgh, United States, [2]General Motors, Warren, United States*

P1-45
Reconfigurable Concurrent Oscillator (RCO)
U. L. Rohde[1,2], A. K. Poddar[2], *[1]Synergy Microwave Corp., Paterson, United States, [2]Brandenburg Univ. of Tech, Cottbus, United States*

P1-46
Estimation and Adaptive Control of the DC Component of Impulse Sensitivity Functions in CMOS LC Oscillators
D. S. Douglas[1], J. S. Kenney[2], *[1]MetaLink Broadband RFIC Design Center, Norcross, United States, [2]Georgia Institute of Technology, Atlanta, United States*

P1-47
A Wideband Injection Locked Frequency Divider Based on a Process and Temperature Compensated Ring Oscillator
R. Vijayaraghavan, M. R. Haider, S. K. Islam, C. Su, *The University of Tennessee, Knoxville, United States*

P1-48
Spur and Noise Reduction Techniques in Ring Oscillator Based Frequency Synthesizers for Broadcast Receiver SoCs
A. Maxim, *Silicon Laboratories, Austin, United States*

P1-49
Direct Matching of a Miniaturized Antenna to an On-Chip Low Noise Amplifier
G. Shaker[1], M. Nezhad-Ahmadi[2], S. Safavi-Naeini[1], G. Weale[2], *[1]University of Waterloo, Waterloo, Canada, [2]American MicroElectronic Semiconductors (AMI-S) Canada, Waterloo, Canada*

P1-50
A System-on-Package Structure LTCC Resonator for a Low Phase Noise and Power Efficient Millimeter-Wave Oscillation
D. Jung, K. Eun, C. Park, *Information and Communications University (ICU), Daejeon, Republic of Korea*

P1-51
A Low Phase Noise and Low Power Series Coupled Quadrature VCO Using Reconfigurable LC Tank
C. Kim, S. Shin, H. Yoo, *Information and Communications University, 119 Munjiro, Yuseong-gu, Republic of Korea*

P1-52
A Miniature Micro-machined Millimeter-wave Bandpass Filter By CMOS Compatible ICP Deep-Trench Technology
J. Chang[1], Y. Lin[1], C. Chen[1], T. Wang[2], S. Lu[2], *[1]National Chi Nan University, Puli, Taiwan, [2]National Taiwan University, Taipei, Taiwan*

P1-53
Enhanced Linearity Technique for Multithrow TX/RX Switches
D. Prikhodko, J. Mason, C. Wei, O. Klimashov, G. Zhou, G. Tkachenko, S. Sprinkle, R. Carter, S. Nabokin, J. Chiesa, *Skyworks Solutions, Woburn, United States*

P1-54
Exact Calculation of Phase Noise of RF Digitally Controlled Oscillator with Frequency Resolution Improved by Dithering
G. Baudoin, *ESIEE, Noisy Le Grand, France*

P1-55
60 GHz Flip-Chip Mounted Frequency Doubler/PA Chain MMIC with Low Input Power and High Output Power
Y. Kim, S. Song, K. S. Seo, Y. Kwon, *Seoul National University, Seoul, Republic of Korea*

P1-56
Wideband High Dynamic Range Distortion Measurement
J. R. Wilkerson, K. G. Gard, M. B. Steer, *North Carolina State University, Raleigh, United States*

P1-57
High Efficiency Digitally Linearized GaN Based Power Amplifier for 3G Applications
S. Bensmida, O. Hammi, F. M. Ghannouchi, *University of Calgray, Calgary, Canada*

P1-58
Design and Implementation of an Inverse Class-F Power Amplifier with 79% efficiency by using a Switch-based Active Device Model
P. Aflaki, R. Negra, F. M. Ghannouchi, *University of Calgary, Calgary, Canada*

P1-59
A Modified Golden Search Algorithm for Second Loop Control in a Pilot-Assisted Feedforward Power Amplifier
R. N. Braithwaite, *Powerwave Technologies, Santa Ana, United States*

P1-60
A Non-Collinear Descent Algorithm for Controlling the First Loop in a Feedforward Power Amplifier
R. N. Braithwaite, *Powerwave Technologies, Santa Ana, United States*

P1-61
Two-PLL Forward Diophantine Frequency Synthesizer
P. P. Sotiriadis, A. Silva, *Johns Hopkins University, Baltimore, United States*

P1-62
High-accuracy Positioning System using Visible LED lights and Image Sensor
M. Yoshino, S. Haruyama, M. Nakagawa, Keio Univercity, Yokohama, Japan

P1-63
Modulation Characteristics of the Photonic Up-conversion Based on Crossabsorption Modulation in the MQW-EAM for 60-GHz Applications
C. Park[1], Y. Guo[1], Y. Yeo[1], L. Ong[1], Y. Wang[1], R. Miura[2], *[1]Institute for Infocomm Research (I2R), Singapore, Singapore, [2]National Institute of Infomation and Communications Technology (NICT), Singapore, Singapore*

P1-64
Investigation of DC-Offset and Flicker Noise for Combined Single Shot Galileo/GPS Receivers With Homodyne Frontend Architecture
H. J. Ehm, S. M. Winter, R. Weigel, *University Erlangen-Nuremberg, Erlangen, Germany*

SYMPOSIUM BANQUET
ROSEN CENTRE ORLANDO

Wednesday, January 23, 2008
Reception: 6:00 PM; Dinner: 7:00 PM

Join us for the Radio and Wireless Symposium Banquet featuring Student Competition Award Presentation and a featured speaker. A gourmet three course meal and open bar will be provided. Admission to the Banquet is open to all attendees at a modest cost and tickets can be purchased via the registration website and at the onsite registration counters.

Featured Speaker: Charlie Jackson, *NGST*
"Woodwinds and Microwaves"

Woodwind musical instruments consist of holes and tubes that enable a musician to play different notes. Woodwinds can be modeled with open holes as short circuits, and tubes as transmission lines. By modeling an instrument the way a microwave engineer would, an instrument can be designed.

This talk shows how to use transmission line approximations and cascaded transmission line theory to model woodwind instruments. Many renaissance woodwinds, such as the flute, crumhorn, and cornetto can be modeled in this way, and historic and modern designs will be demonstrated during the talk.

RWS 2007 Steering Committee

THURSDAY, JANUARY 24, 2008

Session: TH1A

Signal Processing for Wireless Systems
Chair: Husheng Li, *Qualcom, Inc*
Co-Chair: Huseyin Arslan, *University of South Florida*

TH1A-1 – 8:00 AM
Multi-dimensional Signal Analysis and Measurements for Cognitive Radio Systems
A. Hesham, H. Arslan, *University of South Florida, Tampa, United States*

TH1A-2 – 8:30 AM
Common Radio Resource Management for Access Selection in Multi-Access Networks
F. Jin[1], H. Choi[1], J. Kim[2], J. Sohn[3], H. Choi[3], *[1]The George Washington Univ., Washington, USA, [2]SK Telecom, [3]Seoul National Univ., Seoul, Republic of Korea*

TH1A-3 – 8:50 AM
Capacity of UMTS-FDD-Based Cellular Systems with Smart Antennas in Presence of Position and Alignment Errors
S. Bieder, L. Häring, A. Czylwik, *University of Duisburg Essen, Duisburg, Germany*

TH1A-4 – 9:10 AM
A Study on Effect of Interference in Cooperative Communication
B. J. Sepko, W. Lee, *University of Arkansas, Fayetteville, United States*

TH1A-5 – 9:30 AM
Fast Convergence of Distributed Joint Spreading Sequence and Power Control Algorithms
C. Lacatus, D. Akopian, M. Shadaram, *University of Texas at San Antonio, San Antonio, United States*

TH1A-6 – 9:50 AM
Performance evaluation of decision directed channel estimation for single user IFDMA
W. Li[1], O. Takyu[2], K. Adachi[1], M. Nakagawa[1], *[1]Keio University, Yokohama, Japan, [2]Tokyo University of Science, Noda, Japan*

Session: TH2A

System Challenges in the Wireless Communications
Chair: Peter Hill, *Cranfield University*
Co-Chair: Abbas Jamalipour, *University of Sydney*

TH2A-1 – 10:30 AM
Blind User Separation Based on Pulse-waveform and Carrier Frequency Offset Diversity
Athina Petropulu, *Drexel University, Philadelphia, PA, United States*

TH2A-2 – 11:00 AM
Achievable Rate Comparison between Single- and Multi-user MIMO Transmissions with Imperfect Channel State Information
S. Vishwanath , C. Lee, C. Chae, R. Heath, *University of Texas at Austin, Austin, United States*

TH2A-3 – 11:30 AM
Ultra-Wideband Technology: Yesterday, Today, and Tomorrow
X. Hu, L. Yang, *University of Florida, Gainesville, United States*

TH2A-4 – 12:00 PM
Emerging Technologies in Software Defined Receivers
P. Kotte[1], S. Hoyos[1], B. M. Sadler[2], *[1]Texas A&M University, College Station, United States, [2]Army Reasearch Laboratory, Adelphi, United States*

Session: TH1B

mm-Wave Antennas and the Design of Frequency Slective Surfaces
Chair: S. Safavi-Naeini, *Univ. of Waterloo, Canada*
Co-Chair: T. M. Weller, *Univ. of South Florida*

TH1B-1 – 8:00 AM
Modeling of an Active Frequency Selective Surfaces
K. Chang[1], S. Kwak[2], Y. Yoon[1], *[1]Yonsei University, Seoul, Republic of Korea, [2]ETRI, Daejeon, Republic of Korea*

TH1B-2 – 8:20 AM
Tapered Dielectric Image-Line Antenna Array for Millimeter-Wave Applications
S. Gigoyan, D. Saeedkia, M. Neshat, H. Chen, S. Safavi-Naeini, *University of Waterloo, Waterloo, Canada*

TH1B-3 – 8:40 AM
Broadband Millimeter-Wave Quasi-Yagi Antenna Using Substrate Integrated Waveguide Technique
Z. Zhang, K. Wu, N. Yang, *Poly-Grames Research Center, Montreal, Canada*

TH1B-4 – 9:00 AM
Micro Coaxial-Fed Millimeter-wave Slot Antenna
S. P. Natarajan, T. M. Weller, *University of South Florida, Tampa, United States*

TH1B-5 – 9:20 AM
Substrate Iintegrated Cricuits (SICs) for Low-cost High-density Integration of Millimeter-wave Wirelesss Systems
Ke Wu, *Ecole Polytechnique (University of Montreal), Montreal, Quebec, Canada*

Session: TH2B

Compact Miniaturized Wireless Antennas
Chair: J. Schaffner, *HRL Laboratories*
Co-Chair: Kishk, *Univ. of Olemiss*

TH2B-1 – 10:30 AM
Handheld Antenna Design Challenges in the Context of Multiband Operation and their EM Effects on Wireless Device Performance
Yihong Qi and Nagula Sangary, *Research In Motion, Waterloo, Ontario, Canada*

TH2B-2 – 11:00 AM
Novel Hybrid Reconfigurable Multi-band Antennas for Multi-radio Platforms - Handsets & Laptops
S. Yang[1], A. E. Fathy[1], S. M. El-Ghazaly[1], V. K. Nair[2], *[1]Unversity of Tennessee, Knoxville, United States, [2]Intel Corporation, Hillsboro, United States*

TH2B-3 – 11:20 AM
Novel Compact Circular N-shaped patch Antenna for 5.2 GHz Wireless Communications
A. H. Moustafa[1], E. A. Abdallah[1], E. A. Hashish[2], *[1]Electronics Rsearch Institute, [2]Cairo Univeristy, Giza, Egypt*

TH2B-4 –11:40 AM
Electrically Small Folded Slot Antenna utilizing Capacitive Loaded Slot Lines
M. C. Scardelletti, J. S. Minor, C. A. Zorman, *NASA Glenn Reasrch Center, Cleveland, United States*

TH2B-5 – 12:00 PM
Unidirectional Miniaturized Slot Antennas
M. Al-Joumayly, N. Behdad, *University of Central Florida, Orlando, United States*

TH2B-6 – 12:20 PM
Development of an Electrically Small One-Sided Directional Antenna with Matching Circuit
H. Kanaya[1], R. Nabeshima[1], R. Pokharel[1], K. Yoshida[1], M. Tsujii[2], R. Iino[2], *[1]Kyushu University, Fukuoka, Japan, [2]Toppan Printing Co., Ltd., Sugito, Japan*

Session: TH1C

RF Design and Development
Chair: Brian Sadler, *US Army Research Laboratories*
Co-Chair: Harris "Chip" Moyer, *HRL Laboratories*

TH1C-1 – 8:00 AM
Development of a 300 m 2.4 GHz Frequency Band Leaky Coaxial Cable for Wireless Network Access
M. Nakamura[1], H. Takagi[1], K. Einaga[2], T. Nishikawa[2], N. Moriyama[2], K. Wasaki[3], *[1]Nagano Prefecture General Industry Tech. Center, Matsumoto, Japan, [2]Ryousei Comm. System LTD., Amagasaki, Japan, [3]Shinshu Univ., Nagano, Japan*

TH1C-2 – 8:30 AM
Impact of RF Circuit Imperfections on Multi-carrier and Single-carrier based Transmissions at 60 GHz
U. H. Rizvi, G. J. Janssen, J. H. Weber, *Delft University of Technology, Delft, Netherlands*

TH1C-3 – 8:50 AM
10-Gbit/s MMIC Wireless Link Exceeding 800 Meters
R. Yamaguchi[1], A. HIrata[1], T. Kosugi[1], H. Takahashi[1], N. Kukutsu[1], T. Nagatsuma[1], Y. Kado[1], H. Ikegawa[2], H. Nishikawa[2], T. Nakayama[2], *[1]NTT Corp., Atsugi, Japan, [2]Fuji Television Network, Inc., Daiba, Minato-ku, Japan*

TH1C-4 – 9:10 AM
An Alternative Design Flow for Receiver Performance Optimization through a Trade-off between RF and ADC
W. Deng, R. Mahmoudi, A. V. Roermund, *Eindhoven University of Technology, Eindhoven, Netherlands*

TH1C-5 – 9:30 AM
Analysis and Design of Analog Front-end for Passive RFID Tag with Single-circle Antenna
X. Wang, J. Tian, N. Yan, H. Min, *Fudan University, ShangHai, China*

TH1C-6 – 9:40 AM
Emerging Opportunities of RF IC/System for Future Cognitive Radio Wireless Communications
K. Lim and J. Laskar, *Georgia Electronic Design Center, Georgia Institute of Technology, Atlanta, GA, United States*

Session: TH2C

Progress in Efficiency and Linearity Enhancement for Power Amplifiers
Chair: Kevin Gard, *North Carolina State University*
Co-Chair: Ray Pengelly, *Cree Inc.*

TH2C-1 – 10:30 AM
Modeling Correlated and Uncorrelated Distortion in Communication Systems
F. P. Hart[1], N. B. Carvalho[2], K. G. Gard[1], M. B. Steer[1], *[1]North Carolina State University, Raleigh, United States, [2]Universidad de Aveiro, Aviero, Portugal*

TH2C-2 – 10:50 AM
Multi-Octave High Power Recycling Combiner using Coaxial Line to Improve Overall Efficiency of Outphasing Power Amplifier
S. Lin[1], A. E. Fathy[1], G. M. Hegazi[1,2], T. Chu[1,2], *[1]University of Tennessee Knoxville, Knoxville, United States, [2]Rockwell Collins Inc, Cedar Rapids, United States*

TH2C-3 – 11:10 AM
On the Out-phasing Power Amplifier Nonlinearity Analysis and Correction Using Digital Pre-distortion Technique
M. Helaoui, S. Boumaiza, F. Ghannouchi, *University of Calgary - iRadio Lab, Calgary, Canada*

TH2C-4 – 11:30 AM
Behavioral Modeling of Nonlinear Power Amplifiers Using Threshold Decomposition-Based Piece Wise Linear Approximation
K. M. Gharaibeh, *Yarmouk University, Irbid, Jordan*

TH2C-5 – 11:50 AM
Crest Factor Reduction through In-band and Out-of-band Distortion Optimization
P. Swaroop, K. G. Gard, *North Carolina State University, Raleigh, United States*

THURSDAY, JANUARY 24, 2008

Session: TH3A
Ad-hoc Networks
Chair: Mehdi Shadaram, *University of Texas at San Antonio*
Co-Chair: Jeff Frolik, *Univeristy of Vermont*

TH3A-1 – 1:30 PM
Communication and Localization Networks in Swarm Intelligent Systems
M. Angermann[1], O. Heunecke[2], W. Truskowski[3], *[1]DLR, Germany, [2]University of Bundeswher, Germany, [3]NASA*

TH3A-2 – 2:00 PM
Precise Distance Measurement with Cooperative FMCW Radar Units
A. Stelzer[1,2], M. Jahn[1], S. Scheiblhofer[2], *[1]Johannes Kepler University, Linz, Austria, [2]Christian Doppler Research Laboratory for Integrated Radar Sensors, Linz, Austria*

TH3A-3 – 2:20 PM
Wireless Sensor Network: Water Distribution Monitoring System
M. Lin, Y. Wu, I. Wassell, *Cambridge University, Cambridge, United Kingdom*

TH3A-4 – 2:40 PM
A New Centralized Algorithm for Localization Based on Wireless Sensor Networks
A. Chehri, *Laval University, Sainte-Foy, Canada*

TH3A-5 – 3:00 PM
Precise Distance Measurement with IEEE 802.15.4 (ZigBee) Devices
S. Schwarzer[1,2], M. Vossiek[2], M. Pichler[3], A. Stelzer[4], *[1]Siemens AG, Otto-Hahn-Ring 6, Munich, Germany, [2]Clausthal Univ. of Tech., Clausthal-Zellerfeld, Germany, [3]Linz Center of Mechatronics, Linz, Austria, [4]Johannes Kepler Univ., Linz, Austria*

TH3A-6 –3:20 PM
Cross-Layer Routing for Congestion Control in Wireless Sensor Networks
Y. Hsu, K. Feng, *National Chiao Tung University, Hsinchu, Taiwan*

Session: TH3B (SiRF & RWS Joint Session)
Highly-integrated Si transceiver ICs for Wireless Systems
Chair: Kenjiro Nisikawa, *NTT Lab, Japan*
Co-Chair: Zhenqiang "Jack" Ma, *Univ. of Wisconsin-Madison*

TH3B-1 – 1:30 PM
A Single-chip Digitally Enhanced Radio Receiver for DBS Satellite TV Applications
A. Maxim, *Silicon Laboratories, Austin, United States*

TH3B-2 – 1:50 PM
A 5GHz-band SiGe-MMIC Transceiver for 324Mbps Transmission
H. Ueda[1], K. Nakajima[1], G. Kanazawa[1], M. Shimozawa[1], J. Koide[1], M. Uesugi[1], R. Takeuchi[1], N. Suematsu[1], Y. Isota[1], S. Kameda[2], H. Nakase[2], T. Takagi[2], K. Tsubouchi[2], *[1]Mitsubishi Electric Corp., Kamakura-city, Japan, [2]Tohoku Univ., Sendaicity, Japan*

TH3B-3 – 2:10 PM
CMOS UWB Transmitter and Receiver with Silicon Integrated Antennas for Inter-chip Wireless Interconnections
T. Kikkawa, N. Sasaki, M. Fukuda, K. Kimoto, *Hiroshima Univ., Higashi-hiroshima , Japan*

TH3B-4 – 2:30 PM
Single-Chip 5.8GHz DSRC Transceiver with Dual-Mode of ASK and Pi/4-QPSK
N. Sasho, K. Minami, H. Fujita, T. Takahashi, K. Iimura, M. Abe, A. Yasuda, *Sony corporation, Atsugi, Japan*

TH3B-5 – 2:50 PM
A Prototype Analog/Mixed-Signal Fast Fourier Transform Processor IC for OFDM Receivers
M. Lehne, S. Raman, *Wireless Microsystems Lab, Blacksburg, United States*

TH3B-6 – 3:10 PM
Wireless Transeiver Design for SOC and SDR
P. T. van Zeijl, *Philips Research, Eindhoven, Netherlands*

Session: TH3C
Satellite Communications
Chair: Victor Manuel Lubecke, *Univ. of Hawaii at Manoa*
Co-Chair: Debabani Choudhury, *Intel Corp.*

TH3C-1 – 1:30 PM
Positioning Technologies for Implementation of the Always Best Located Algorithm
L. Reyero[1], G. Y. Delisle[2], *[1]Institut National de la Recherche Scientifique, Montreal, Canada, [2]International Institute of Telecommunications, Montreal, Canada*

TH3C-2 – 1:50 PM
A Mobility Model for Heterogeneous Wireless Networks
A. Hasib, A. O. Fapojuwo, *The University of Calgary, Calgary, Canada*

TH3C-3 – 2:10 PM
The use of Explicit Congestion Notification to Shape Traffic of an Intelligent Satellite System
W. Almuhtadi[1], B. Cheng[2], D. R. Murphy[1,2], *[1]Algonquin College, Ottawa, Canada, [2]Eion, Ottawa, Canada*

TH3C-4 – 2:30 PM
Optimal Power Allocation For Multiple Beam Satellite Systems
Y. Hong, A. Srinivasan, B. Cheng, *EION Inc., Ottawa, Canada*

TH3C-5 – 2:50 PM
An Advanced GEO Bentpipe V-Band Satellite System: Next-Generation Broadband Satellite Access
A. Grami, *University of Ontario Institute of Technology, Oshawa, Canada*

TH3C-6 – 3:00 PM
Digitally Beam Formed Multibeam Phased Array Antennas for Future Communication Satellites
Afshin S Daryoush, *Drexel University, Philadelphia, PA, United States*

Session: TH4A
Wireless Sensors
Chair: Clemens Rupple, *EPCOS*
Co-Chair: Mohammad Khojastehpour, *NEC America*

TH4A-1 – 4:00 PM
Combating routing holes by means of mobile nodes: Should energy really matter!?
N. Vlajic, N. Moniz, M. Portnoy, *York University, Toronto, Canada*

TH4A-2 – 4:20 PM
Flow-fair Intra-Piconet (FLIP) Scheduling for Communications in Personal Area Networks
S. Basagni[1], M. A. Nanni[1], C. Petrioli[2], *[1]Northeastern, Boston, United States, [2]Univ. di Roma "La Sapienza", Roma, Italy*

TH4A-3 – 4:40 PM
Performance Simulation of a Wireless Relay Network
C. J. Cook, *Cook Industries LLC, Arlington, United States*

TH4A-4 – 5:00 PM
Efficient Implementation of an Energy-Conserving Multicast Routing Protocol for Wireless Multihop Networks
Y. Huang, W. Liu, K. Feng, *National Chiao Tung University, Hsinchu, Taiwan*

TH4A-5 – 5:20 PM
A Multi-cell UWB-IR Localization System for Robot Navigation
P. Sharma, S. Krishnan, G. Zhang, *Institute for Infocomm Research, Singapore, Singapore*

Session: TH4B
Innovative Components and RF Modules
Chair: Norman Chiang, *Teledyne Microwave*
Co-Chair: Walter De Raedt, *IMEC, Belgium*

TH4B-1 – 4:00 PM
High Power RF Switch MMICs Development in GaN-on-Si HFET Technology
M. K. Yu, R. J. Ward, G. M. Hegazi, *Rockwell Collins Inc., Cedar Rapids, United States*

TH4B-2 – 4:20 PM
Design of Dual-Band Balun with Tapped Stubs
H. Zhang, Y. Peng, H. Xin, *University of Arizona, Tucson, United States*

TH4B-3 – 4:50 PM
A Compact Single Band 802.11 n Front-end Module for MIMO Applications Using Multi-layer Organic Technology
S. S. Dalmia, R. Fathima, L. Carastro, C. Ghiu, G. White, *Jacket Micro Devices, Atlanta, United States*

TH4B-4 – 5:00 PM
A Single-Chip 53 GHz Radiometer Front-End MMIC for Geostationary Atmospheric Measurements
S. E. Gunnarsson[1], A. Emrich[2], H. Zirath[1,3], R. Kozhuharov[1], C. Kärnfelt[1], J. Embretsen[2], C. Tegnander[2], *[1]Chalmers Univ. of Technology, Goteborg, Sweden, [2]Omnisys Instruments AB, Goteborg, Sweden, [3]Ericsson AB, Molndal, Sweden*

TH4B-5 – 5:20 PM
Multiband Receiver for Base-Station Applications
T. Tikka, J. Ryynänen, K. Halonen, *Helsinki University of Technology, Espoo, Finland*

Session: TH4C
Ultra-wide Band Systems
Chair: Franek Nekonegar, *Lawrence Livermore National Laboratory*
Co-Chair: *Masoomeh Nasiri Kenari, Sharif Univ.of Tech.*

TH4C-1 – 4:00 PM
A Simulation Comparison of Time-Hopping PAM and Interference Suppressing OFDM in Multiuser Ultra Wideband Communications Systems
D. C. Popescu [1], P. Yaddanapudi[2], R. Gvs[2], *[1]Old Dominion University, Norfolk, United States, [2]University of Texas at San Antonio, San Antonio, United States*

TH4C-2 – 4:20 PM
On Characterizing Multiple Access Interference in TH-UWB Systems with Impulsive Noise Models
B. Hu, N. C. Beaulieu, *University of Alberta, Edmonton, Canada*

TH4C-3 – 4:40 PM
IFI and ISI in High Data Rate UWB Coherent Transceivers
S. Ahmed[1], H. Arslan[2], *[1]University of South Flordia, Tampa, United States, [2]University of South Florida, Tampa, United States*

TH4C-4 – 5:00 PM
Measuring Interference from a UWB Transmitter in the GPS L1 Band
T. H. Van Slyke, W. B. Kuhn, B. Natarajan, *Kansas State University, Manhattan, United States*

TH2A-5 – 5:20 PM
Orthogonal Projections Based Algorithm for Array Signal Subspace Estimation
L. Zhang, J. Huang, *Northwestern polytechnical university, Xi'an, China*

WORKSHOPS

Sunday Workshops

WS1: ADVANCED RF PACKAGING SOLUTIONS: MODULAR DESIGN SCALING AND INTEGRATION OF RF MEMS SWITCHES

Sunday, January 20, 2008 — 1:30 PM–5:30 PM

Organizers: Telesphore Kamgaing, *Intel Corporation*
Rashaunda M. Henderson, *University of Texas, Dallas*

Speakers: Mohamed Megahed, *Intel Corporation*
William Chappell, *Purdue University*
Anh-Vu Pham, *University of California at Davis*
Scott Baker, *University of Virginia*
John McKillop, *Teravita Inc.*

Form factor reduction and increased functionality integration continue to be major drivers for future wireless communication systems. Solutions to these challenges include the use of scalable packaging technologies and hardware reuse through reconfigurable designs. This half day workshop will focus on recent research and development work that targets RF system miniaturization with half of the talks focusing on system miniaturization through package and component scaling such as interconnect redistribution and use of integrated/embedded passives-based RF modules. Approaches addressing the integration of multi-radio such as WiFi, WiMax, Bluetooth and GPS on a single platform will be presented. The development and applications of low-loss substrates from low-GHz to millimeter wave frequencies will also be discussed. The second half of the workshop will focus on the design and application of RF MEMS as enabler for miniaturization through reconfigurability.

WS2: REVIEW OF COMPACT RF FILTER TECHNOLOGY

Sunday, January 20, 2008 — 1:30 PM–5:30 PM

Organizers: David Penunuri, *Rockwell Collins*

Speakers: M. P. Busse, *Dielectric Laboratories, Inc*
D. Penunuri and J. Estes, *Rockwell Collins*
M.A. Dubois, *CSEM*
B.P. Abbott, *TriQuint Semiconductor*
P.J. Stephanou, *Harmonic Devices, Inc.*

The accurate measurement of the electrical performance of This half-day workshop will review the progress of several RF filter technologies which have contributed to the miniaturization of RF selectivity for wireless, mobile and other applications. Presently some of these technologies are found in most of the RF portions of a communications system including the receiver front end, transmitter, and IF sections. Of particular interest are miniature low temperature, cofired ceramic (LTCC) module filter banks, thin film bulk acoustic wave (BAW) filters, surface acoustic wave (SAW) filters, RF MEMS devices and high K dielectric resonators. These topics will be specifically covered by the presenters.

WS3: TRANSMITTER DESIGN FOR HIGH POWER EFFICIENCY: THE PATH FROM DEVICE TO ADVANCED SYSTEM ARCHITECTURES

Sunday, January 20, 2008 — 8:30 AM–5:00 PM

Organizers: Fadhel M. Ghannouchi, *University of Calgary*
Slim Boumaiza, *University of Waterloo*

Speakers: Eric Toulouse, *Freescale Semiconductors*
John Wood, *Freescale Semiconductors*
Renato Negra, *University of Calgary*
Ray Pengelly, *CREE*
Bumman Kim, *Postech*
Christian Fager, *Chalmers University*
David Kelly, *PulseWaveRF*
Z. Popovic, *University of Colorado*
F. M. Ghannouchi, *University of Calgary*

This workshop covers the recent technological developments, spanning from device level to system level, aiming at the enhancement of the power efficiency in emerging wireless communications infrastructures. It begins with an overview of the industry perspective on the high efficiency roadmap. Then, a review of the switching mode power amplifiers design based upon a finite number of harmonics will be presented. This part will be illustrated through practical implementations of switching mode amplifiers (Class E, F, F-1, Voltage and Current mode D). An emphasis on the critical issues while designing and realizing these amplifiers will be given. Special focus will also be given to the applications of switching mode amplifiers in the development of advanced high-efficiency transmitter architectures. This workshop will expound on architectures such as Class-M amplifiers, envelop elimination and restoration (EER), and linear amplification using nonlinear components (LINC). An interactive panel session between the attendees and the speakers will close the workshop.

Monday Workshops

WM1: ADVANCES IN ELECTRICALLY SMALL ANTENNAS AND MATERIALS FOR HANDSET APPLICATIONS

Monday, January 21, 2008 — 1:30 PM–5:30 PM

Organizers: James West, *Rockwell Collins*

Speakers:
James B. West, *Rockwell Collins*
Professor John Papapolymerou, *Georgia Tech*
Professor John Volakis/Dr. Chi Ch Chen, *Ohio State University ESL*
Dr. Tayfun Ozdemir, *Monarch Antenna, Inc*.

This workshop will focus on the challenges and new antenna and materials technologies associated with hand set antenna design. The work shop will begin with a brief overview of antenna fundamentals and will describe the challenges associated with handset antenna design, such as band width vs. antenna size in wavelengths, pattern distortion due to asymmetric and electrically small ground planes, EMI/EMC issues, human body interactions, etc. After this introduction, industry expert lecturers will describe integrated antenna Systems-on-a-Package (SOP) technologies, Metamaterials advances, optimal bandwidth for electrically small structures, and adaptive self-structuring antennas that dynamically sense and adapt to their local electromagnetic environments.

WM2: RADIO OVER FIBER TECHNOLOGIES

Monday, January 21, 2008 — 8:30 AM–5:00 PM

Organizers: Dr. Yongxin Guo, *I2R, Singapore*, Prof. Jianping Yao, *University of Ottawa, Canada*

Speakers: Dr. Michael Sauer, *Corning USA*
Dr. Nathan Gomes, *University of Kent*
Dr. Thas A Nirmalathas, *University of Melbourne, Australia*
Dr. Y Horiuchi, *KDDI R&D Laboratories Inc., Japan*
Prof. Zhang XM, *Zhejian University, China*
Prof. C Park, *GIST, South Korea*
Prof. Jianping Yao, *University of Ottawa, Canada*
Dr. Yongxin Guo, *I2R, Singapore*
Prof. Beatrice Cabon, *INPG, France*
Dr. Jianjun Yu, *NEC Labs, USA*

The distribution of radio signals over optical fiber or radio over fiber, with the advantageous features of low loss and large bandwidth offered by the state-of-the-art optical fibers, has been a topic of interest for over a decade. The use of radio-over-fiber techniques could extend the existing wireless coverage, especially the coverage in large buildings such as airports and shopping malls, without significantly increasing the complexity and costs of the base stations. While wireless operators are increasingly focused on filling the coverage gaps, they are finding that macro base stations are often unable to cover these buildings. This is especially true for wireless access networks operating at high-frequency bands, in which the radio signals have difficulty propagating from outdoor base stations to the inside of large buildings. Moreover, a key feature of radio-over-fiber systems is their virtually unlimited bandwidth. This allows radio-over-fiber systems to simultaneously transport a wide range of frequencies and air interface standards. These can range, for example, from GSM at 800 MHz, WLAN at 2.4/5 GHz, and future broadband wireless access networks operating at 60 GHz bands.

In this workshop, recent developments in radio-over-fiber technologies will be discussed. The topics to be cover include:

*Radio over fiber for GSM and 3G
*Radio over fiber for WLAN
*Millimeter-wave radio over fiber
*Ultra-wideband radio over fiberPhotonic generation of microwave and millimeter-wave
*Photonic microwave signal processing
*Radio-over-fiber network architectures
*Advanced modulation formats in radio-over-fiber system
*New devices for radio over fiber

WM3: UNCERTAINTY MANAGEMENT IN NUMERICAL DOSIMETRY EVALUATIONS FOR WIRELESS APPLICATIONS

Monday, January 21, 2008 —1:30 PM–5:30 PM

Organizer: Fouad Hanna Victor, *University of Paris*

Speakers: Andrei Grebennikov, *M/A-COM*, Wiart Joe, Wong Man-Fai, Lautru David, Fouad Hanna Victor, *University of Paris*

Rigorous Electromagnetic Simulations are intensively used in the field of bioelectromagnetism. The evaluation of the interactions between electromagnetic waves and biological tissues for wireless applications have became a worldwide public concern. Important efforts have been carried out to improve the numerical dosimetry estimation. Numerical methods, in particular the FDTD, have been applied, enhanced by the improvements in computational power. The main question is how manage the uncertainty of the results in this particular domain.

In numerical calculations, the uncertainty of result has been reduced to the numerical accuracy of the methods. The main uncertainty of numerical simulations coming from the uncertainty related to the modelling (parameters such as meshing) and from the uncertainty of input data. For international standardization working groups, such as IEEE project 1528 or IEC pt62232, these are key questions with un-settled answers.

This workshop will discuss the following challenges in numerical simulation:

**Estimation of the uncertainty related to the modelling*. For instance, in numerical dosimetry the handset are often simplified. How can we estimate the associated uncertainty and how manage it?

**Estimation of the uncertainty related to the variability.* The data used in numerical simulations are not exact. Due to industrial process or life variability, the input data should be described using statistical distribution. How can we estimate the uncertainty of output data associated to the uncertainty of input data. . In numerical dosimetry, the morphology posture and internal anatomy has an effect on the power absorption distribution in human body. There is a challenge in how to develop methods to assess and manage these uncertainties. Colorado will discuss outphasing amplification using class D and Chireix combiner.

This workshop will conclude with a panel session.

Friday Short Courses

SC1: SWITCHING-MODE POWER AMPLIFIERS AND THEIR APPLICATIONS IN ADVANCED WIRELESS COMMUNICATION TRANSMITTERS

Friday, January 25, 2008 — 8:30 AM–12:30 PM

Instructors: Renato Negra and Fadhel M. Ghannouchi, *iRadio Lab, University of Calgary*

This half-day tutorial will begin with the operation principles of all switching-mode power amplifiers. Focus will be on practical implementation issues at microwave frequencies for both monolithic and hybrid microwave integrated circuit implementations. Active device modelling for switching-mode applications will be discussed.The second part of the tutorial emphasises on the application of those highly efficient but nonlinear amplifiers in LINC, EE&R, polar, as well as Delta-Sigma wireless communication transmitters.

SC2: SOFTWARE DEFINED RADIO IN NETWORK CENTRIC OPERATIONS

Friday, January 24, 2008 — 8:30 AM–12:30 PM

Instructor: Alan Tribble, *Rockwell Collins*

This presentation provides an overview of the Software Defined Radio (SDR), a disruptive technology, and its role in Network Centric Operations (NCO). The various elements of an SDR platform and waveform are examined, as are related open standards such as the Software Communications Architecture (SCA). Next, NCO is examined in the context of the US Joint Vision 2010 and 2020 and its emphasis on increased situational awareness. It will be seen that significant improvements in communications bandwidth will be required to achieve full networking of US forces. The presentation concludes with a brief overview of the role of an SDR system, the Joint Tactical Radio System (JTRS), in delivering this increase in bandwidth as part of the Global Information Grid (GIG).

Hotel & Transportation Information

Hotel Info

The RWW 2008 Planning Committee has secured favorable rates for RWW Attendees and Exhibitors at the official meeting venue and one area hotel. In order to receive the Symposium rate, please book your accommodations by December 27, 2007. Please note the discounted rates are only available over official Symposium dates. For reservations outside the official dates please contact the hotels directly.

Contact one of the hotels listed and mention "IEEE RWW 2008" to receive the negotiated room rate. Reservation requests received by hotels after December 27, 2007 will be accepted on a space and rate available basis, and the group rate may not apply.

Rosen Centre – Official Meeting Venue Room Rate: $202.00 Single/Double 9840 International Drive Orlando, Florida 32819 Phone: 1-407-996-9840

Rosen Plaza – Official RWW 2008 Hotel – A mile walk to Rosen Centre Room Rate: $196.00 Single/Double 9700 International Drive Orlando, Florida 32819 Phone: 1-407-996-9700

For online booking capabilities at either of these hotels visit the RWW 2008 website at: *http://radiowireless.org* and click on "Hotel Information".

Government rates are subject to availability and not available via hotel websites. Please call the hotels directly to acquire the government rate. Government credentials will be required at check-in.

Transportation Info

Traveling to/from Airports via taxi or airport shuttle:

Regular transportation to/from Orlando International Airport with Mears Transportation at 407-423-5566 or by calling Star Taxi: (407) 857-9999 or Town and Country Shuttle: Conveniently Located In Hotel Lobby. Reservations Required. $16 One-Way or $22 Roundtrip - In order to get the $22 roundtrip discounted rate, you must call a minimum of 24 hours prior to arrival at Orlando International Airport and ask for the discounted rate code of "TCPP". Direct Phone Numbers: (407) 828-3036 -or- (407) 352-9700

Driving Directions:

Directions from Orlando International Airport. Take the NORTH EXIT as you exit the airport. Take TOLL ROAD 528 WEST, Travel approximately 11 miles to EXIT #1/International Dr./Convention Center/SeaWorld (first exit on the right). Turn right onto International Drive. Rosen Centre is 1/4 mile on the left. Turn left at the 3rd traffic light which is Hawaiian Ct.

Directions from Tampa heading East on I-4, Take I-4 east to Exit 72, (Beachline Expressway or SR 528 - formerly the Bee Line Expressway) (also the International Airport Exit). Once on 528, take the first exit (International Drive SeaWorld Exit). Bear right on International Drive. Rosen Centre Hotel is about 1/4 mile on the left.

Directions from Miami, Fort Lauderdale. Take the Florida Turnpike to I-4 West. Take I-4 West to Exit 72, Beachline Expressway or SR528 (formerly the Bee Line Expressway). Take the first exit (International Dr. and SeaWorld). At the bottom of the exit, bear right on International Drive. Rosen Centre Hotel is about 1/4 mile on the left, just before the Convention Center.

Getting around while in Orlando! In addition to taxi and limousine service to anywhere in the Greater Orlando area, the city's Lynx bus system provides economical and dependable public transportation around the area. Bus stops are marked with a "paw" print of a Lynx cat. Buses run every 15 minutes in busy areas and every 30 minutes in urban areas and service more than 80,000 riders each weekday. The downtown Orlando Lymmo bus system is a free downtown circulator with 21 stops reaching from the Amway Arena to City Hall. Buses run every five to 10 minutes.

In addition, the I-Ride Trolleys serve the popular International Drive resort area year-round, seven days a week, from 8 a.m. to 10:30 p.m. with scheduled stops every 20 minutes. The two routes with 107 stops are designated with numbered "I-Ride" location markers. For a leisurely spin around downtown Orlando, carriage rides and bicycle rickshaws are also available through local vendors.

Advance Conference Registration Form

One form per registrant – Advance Registrations will be accepted until January 7, 2008

IEEE Radio and Wireless Symposium

22 - 24 Jan 2008 Orlando, FL

incorporating WAMICON

Part of Radio and Wireless Week

IEEE MTTS AP/S IEEE COMMUNICATIONS SOCIETY

Mail	**Fax**	**Online**
Fly Events LLC Attn: RWW 2008 P.O. Box 29 Milltown, NJ 08850	(via credit card payment) 732-297-0878	www.rawcon.org

Name: _____

Company: _____

Street Address: _____

City: _____ **State:** _____ **Zip Code:** _____

Phone: _____ **Fax:** _____

E-Mail: _____

IEEE Member: ☐ **IEEE Membership Number:** _____

To register check the appropriate boxes next to desired option. A paid registration is required to attend all Workshops, Tutorials, Technical Sessions, meals and special events except the Rump Session and Exhibition, which are free to all participants. An e-mail confirmation will be sent within 5-7 business days after receipt of this completed form. Refunds will be granted minus a $50 processing fee on registration cancellations on or before 15 December. Cancellation requests received after 15 December will be charged the full registration fee. For questions call: 732-297-5012

	IEEE Member	Non-Member
Combined PAS, RWS and SiRF Passport		
(Includes everything included in individual registrations except SiRf Banquet)	☐ $630	☐ $780
Student, Retiree, Life Member	☐ $300	☐ $350
IEEE Power Amplifiers Symposium (PAS)		
(Included printed PAS Digest, Breakfast, Lunch & Monday Reception)	☐ $200	☐ $300
PAS Student, Retiree, Life Member	☐ $100	☐ $150
Additional copy of PAS Digest	☐ $20	☐ $35
PAS Banquet Ticket (Required for attendance)	☐ $40	☐ $40
IEEE Radio and Wireless Symposium		
***(Includes** CD Rom, all Tues-Thurs RWS Sessions, Breakfast and Lunch)*	☐ $330	☐ $430
Student, Retiree, Life Member	☐ $155	☐ $215
RWS Single Day Registration (*Circle Tues, Wed. OR Thurs*)	☐ $155	☐ $205
Single Day Student, Retiree, Life Member	☐ $80	☐ $105
Additional copy of RWS Proceedings CD Rom	☐ $35	☐ $60
RWS Reception/Banquet (Wednesday)	☐ $40	☐ $40
The 8th Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems (SiRF)		
(Includes SiRF Digest, Reception & Banquet and Sessions)	☐ $310	☐ $420
Student, Retiree, Life Member	☐ $150	☐ $200
Additional SiRF Banquet Ticket (Thursday)	☐ $40	☐ $40
RWS Workshops and Short Courses (Includes printed notes and meals where appropriate)		
WS 1 Sunday (Half Day PM)	☐ $100	☐ $150
Student, Retiree, Life Member	☐ $75	☐ $75
WS 2 Sunday (Half Day PM)	☐ $100	☐ $150
Student, Retiree, Life Member	☐ $75	☐ $75
WS 3 Sunday (Full Day)	☐ $200	☐ $250
Student, Retiree, Life Member	☐ $150	☐ $150
WM1 Monday (Half Day PM)	☐ $175	☐ $225
Student, Retiree, Life Member	☐ $125	☐ $125
WM2 Monday (Full Day)	☐ $200	☐ $250
Student, Retiree, Life Member	☐ $150	☐ $150
WM3 Monday (Half Day PM)	☐ $175	☐ $225
Student, Retiree, Life Member	☐ $125	☐ $125
SC1 Friday (Half Day)	☐ $250	☐ $350
Student, Retiree, Life Member	☐ $175	☐ $175
SC2 Friday (Half Day)	☐ $250	☐ $350
Student, Retiree, Life Member	☐ $175	☐ $175

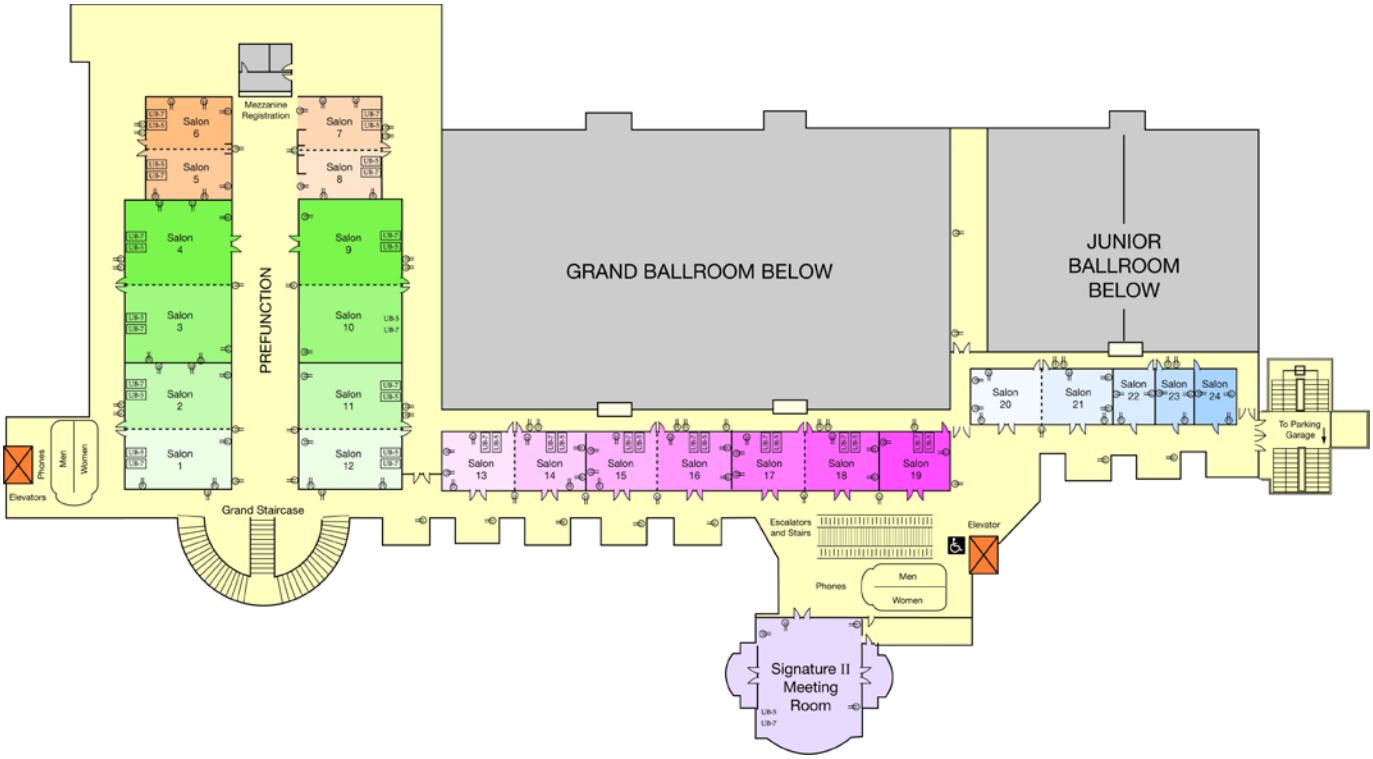
Visa, Mastercard, American Express and Checks are accepted. Please make checks payable to Fly Events LLC and mail to address above. Registration charges will appear as SeeUThr-Fly Events on your statement. A $50 fee and automatic conference cancellation will be charged for all returned checks.

☐ American Express ☐ Mastercard ☐ Visa ☐ Check

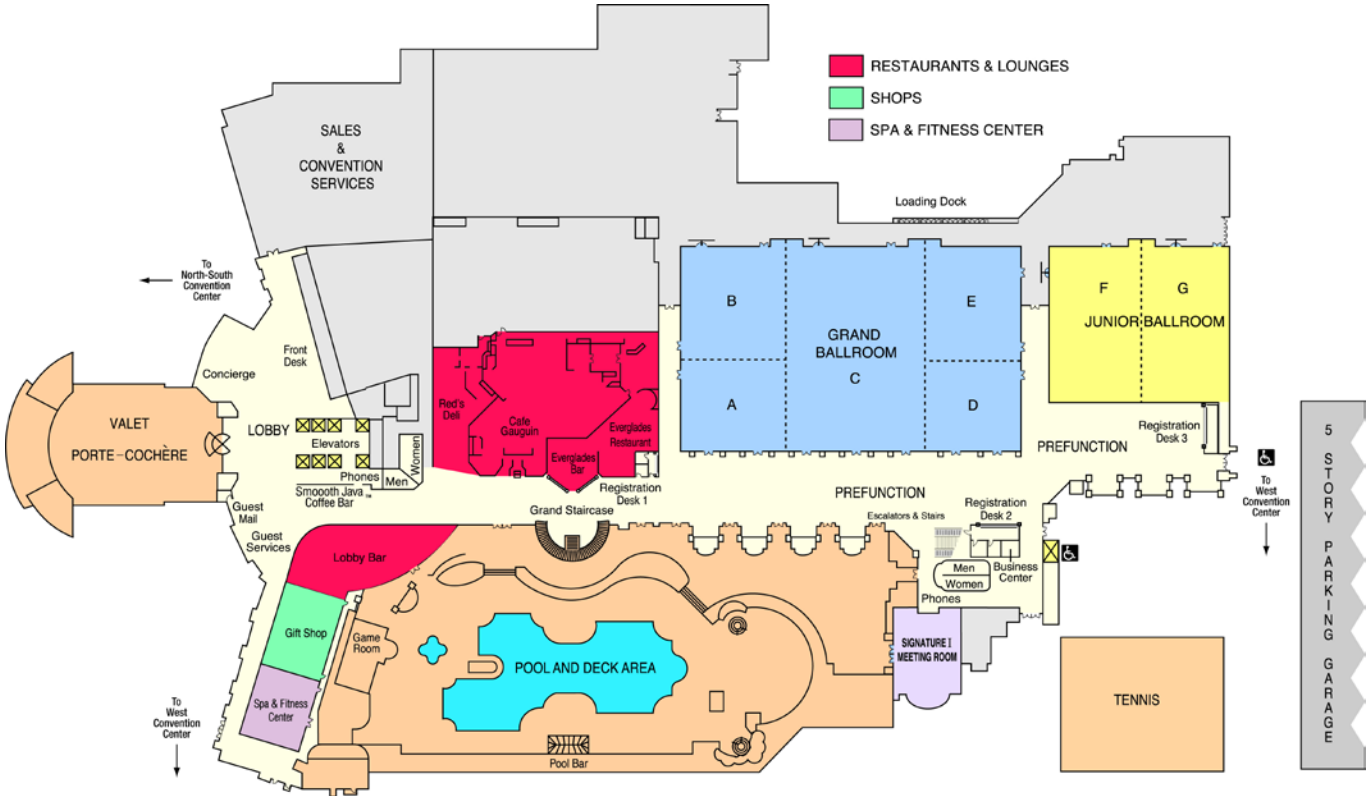
Credit Card Number: _____ Exp. Date_____

Signature: _____ Total: $_____

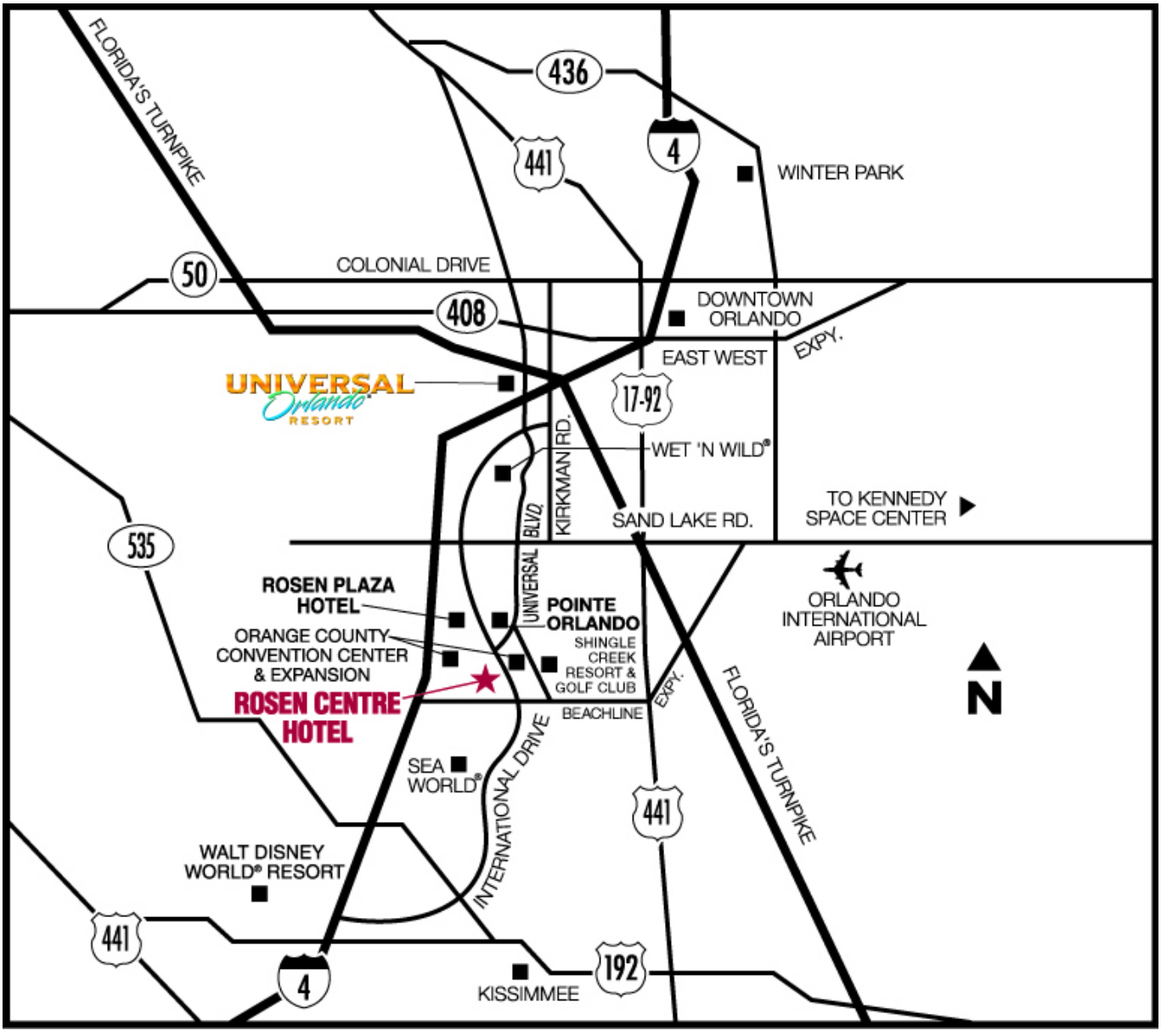
Rosen Centre Meeting Rooms



Rosen Centre Ground Floor



Orlando Area Map



2008 IEEE Radio and Wireless Symposium

2008 Radio & Wireless Week at a Glance

	Activity	Location	SUN 1/20				MON 1/21				TUE 1/22				WED 1/23				THU 1/24				FRI 1/25			
			M	N	A	E	M	N	A	E	M	N	A	E	M	N	A	E	M	N	A	E	M	N	A	E
RWS	Workshops	Rosen Centre	■	■	■		■	■	■																	
	Short Courses	Rosen Centre																					■			
	Plenary Session	Rosen Centre									■															
	Technical Sessions	Rosen Centre											■		■			■	■		■					
	Rump Sessions	Rosen Centre												■												
	Poster Session	Rosen Centre													■											
	Banquet	Rosen Centre																■								
	Attendee Breakfast	Rosen Centre									■				■				■							
Exhibits	Exhibition	Exhibit Area									■	■	■		■	■	■									
	Exhibition Reception	Exhibit Area												■												
	Lunch	Exhibit Area										■				■				■						
	Coffee Break	Exhibit Area									■		■		■		■		■		■		■		■	
PA Symposium	Technical Sessions	Rosen Centre					■	■	■		■	■	■													
	Poster Session	Rosen Centre																								
	Reception	Rosen Centre								■																
SiRF	Technical Sessions	Rosen Centre													■		■		■		■		■		■	
	Poster Session	Rosen Centre															■									
	Reception/Banquet	Rosen Centre																				■				
IMS2008	TPC Meeting	Rosen Centre	■	■	■																					

INFORMATION ABOUT ORLANDO, FLORIDA

Orlando is the epicenter of fun and excitement, as nearly 100 attractions keep visitors coming back for more. Take the mix of legendary theme parks, spectacular museums, world-class entertainment and blockbuster rides and attractions, and it would take about 67 eight-hour days to visit all of the entertaining offerings in Orlando.

SHOPPING: From Gucci bags and Tiffany diamonds to Ocean Pacific flip flops - Orlando has boldly emerged as an international shopping leader. And, with more than 52 million square feet (4.6 million square meters) of retail space, including nine regional shopping malls, all tastes and budgets are delightfully satisfied.

DINING: The Orlando area serves up more than 5,300 restaurants to stimulate one's senses and satisfy the palate. Whether it's a casual meal on the run or a lavish four-course affair with crystal and china, Orlando is brimming with fabulous dining possibilities.

ENTERTAINMENT: Visitors take great delight in Orlando's impressive lineup of world-class performing arts. The Orlando Opera, Orlando Ballet, Orlando-UCF Shakespeare Festival, Bach Festival Society, The Orlando Philharmonic Orchestra, Broadway Across America - Orlando series and several professional and community theatre companies are just a few of the area's entertainment options. In addition, House of Blues and Hard Rock Live offer concerts many nights of the week. Cirque du Soleil has a permanent show at Downtown Disney and Universal CityWalk will be home to a new Blue Man Group show in June 2007.

NIGHTLIFE: Once the sun sets, the pulse quickens as O-town's thriving nightlife comes alive. From ultra-hip bars and high-energy dance clubs to laid-back pubs and multi-venue entertainment complexes, Orlando offers plenty of hot spots to live it up. Orlando's night-life options include bars and clubs in downtown Orlando, Universal CityWalk, Downtown Disney Pleasure Island, Restaurant Row and International Drive.

CLIMATE: October — May Average Daily Temperatures: Days — Low 70s F (22 C) to mid 80s F (27 C); Nights — Low 60s F (16 C) to high 60s F (20 C)

VISITATION: Approximately 50 million visitors come to Orlando each year for business and pleasure. Of those guests, 46.5 million are domestic visitors and 3.5 million are international visitors.