



2007 IEEE Radio and Wireless Symposium



ADVANCE PROGRAM

Long Beach Convention Center
Long Beach, California, USA
9 – 11 January, 2007

General Chair:
Mohammad Madihian, *NEC Laboratories America, Inc.*

General Vice-Chairs:
Xiaodong Wang, *Columbia University*
George Heiter, *Heiter Microwave Consulting*

Technical Program Co-Chairs:
Aly Fathy, *University of Tennessee*
Geoffrey Li, *Georgia Institute of Technology*

Proceedings Editor:
Jeremy Muldavin, *MIT Lincoln Laboratory*

Radio & Wireless 2007 Sponsors:
IEEE Microwave Theory and Techniques Society (MTT-S)
IEEE Communications Society (ComSoc)
IEEE Antennas and Propagation Society (APS)

2007
Long Beach



<http://www.radiowireless.org>



IEEE



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

Join us in Long Beach for the 2nd Radio & Wireless Week (RWW) events January 7–12, 2007, not only to learn about the latest technological, scientific, and commercial developments, but also to see friends and experience the Southern California lifestyle with excellent climate, food, and shoreline beauty, all wrapped in one package. The RWW collocates three prestigious conferences and one major commercial exhibition. The overall focus is on key technologies covering from device level to system level for advancement of the current radio and wireless systems as well as creating new concepts and breakthroughs for the next generation networks.

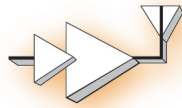
The centerpiece of the week is the IEEE Radio and Wireless Symposium (RWS), which continues the evolution of the successful Radio and Wireless Conference (RAWCON). Three IEEE Societies support the RWS – the ComSoc and AP provide technical co-sponsorship and the MTT provides sponsorship. The RWS brings together a unique mix of communications systems and RF implementations via high-quality invited and contributed papers, rump session, workshops, and short courses. Don't miss our daily Special Invited Session featuring Enabling Technologies for the Next Generation Radio and Wireless Networks lectured by world-class speakers from the industry and academia.

The IEEE Topical Symposium on Power Amplifiers for Wireless Communications (PAS) and Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems (SiRF) are also key parts of the program. The PAS has been bringing leading RF power amplifier engineers together for many years, and will continue that tradition. SiRF has for years presented the latest in silicon RF technologies and applications and will continue its strong tradition.

With these three conferences and a large commercial exhibition along with social events including free receptions and daily breakfast and lunch, we offer you a convenient opportunity to get a comprehensive update in all the technical and commercial facets of the rapidly changing radio and wireless landscape. I look forward to welcoming you in Long Beach!

**Join us Tuesday night from 5 PM to 7 PM
for the Exhibitor Sponsored Reception in the
Exhibit Hall. This is a great opportunity to
meet other attendees
and kick off the week with some food
and drinks.**

POWER AMPLIFIER SYMPOSIUM JANUARY 8 & 9, 2007



The IEEE Topical Symposium on Power Amplifiers for Wireless Communications will be held during Monday, January 8, and Tuesday, January 9, 2007 at the Long Beach Convention Center.

The Power Amplifier Symposium (known in prior years as the Power Amplifier Workshop) provides a forum for presenting the latest innovations in the area of power amplifiers. Power amplifier technology has been changing rapidly, as a result of the need to provide improved efficiency and linearity, as well as reduced cost. Symposium papers will cover devices and IC technologies for power amplifiers, for both handsets and base stations; modeling and design techniques; system requirements and transmitter architectures; linearization and predistortion. Cellular applications, along with WiFi and WiMAX, will be emphasized.

7TH TOPICAL MEETING ON SILICON MONOLITHIC INTEGRATED CIRCUITS IN RF SYSTEMS – JANUARY 10–12, 2007



Conference Chair: Jae-Sung Rieh, *Korea University*

Technical Program Chair: Guofu Niu, *Auburn University*

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

Finance Chair: George E. Ponchak, *NASA-Glenn Research Center*

Digest Editor: Rhonda Drayton, *University of Minnesota*

Local Arrangement Chair: Sergio Pacheco, *Freeseale Semiconductor*

Student Paper Competition Chair: Bill Chappell, *Purdue University*

Executive Committee: Joachim Burghartz, *Inst. for Microelec. Stuttgart*

John D. Cressler, *Georgia Tech*

Rhonda Drayton, *University of Minnesota*

Linda Katehi, *University of Illinois-UC*

Erich Kasper, *University of Stuttgart*

Rudolf Lachner, *Infineon Technologies AG*

Johann-Fredrich Luy, *DaimlerChrysler AG*

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

Guofu Niu, *Auburn University*

John Papapolymerou, *Georgia Tech*

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: Jae-Sung Rieh

The Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems (SiRF) is a unique conference in that it covers a vertical range of topics related to Si-based RF circuits, ranging from materials to passives, MEMS, high-speed devices, integrated circuits, and applications that are all based on Si. This feature provides a precious opportunity for attendees to view this fast-evolving field from different standpoints and also offers a space for exchanging ideas

Invited papers highlighting state-of-the-art developments will be presented, along with contributed papers from around the world.

Sessions will be held during the morning and afternoon of Monday, January 8, and during the afternoon of Tuesday, January 9. The Tuesday morning session will be joint with RWS, including the Plenary presentations (no separate registration is required to attend).

Continental breakfast and a box lunch will be available on Monday for the attendees. 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

PASymposium.ucsd.edu or email
Paul Draxler, pdraxler@qualcomm.com
Peter Asbeck, asbeck@ece.ucsd.edu

between diverse research areas. Such cross-mingling will be additionally supported by the single-session format that has been a tradition of this conference. Over the three days of conference, 12 technical sessions will be held, including one poster session for interactive discussion. Most of the podium sessions will open with an invited talk by world-leading experts in this field that cover a wide range of topics on Si-based circuits, technologies, devices, and modeling. The popular best student paper competition will add excitement to the conference and the banquet will provide a casual stage for social interaction between attendants. You are very welcomed to attend this unique and focused conference and enjoy meeting with great people in this dynamic field. The conference, which will be held as a part of the famous MTT Radio and Wireless Week, will start on Wednesday January 10 and continue for three full days, ending on Friday January 12, 2007. I look forward to meeting you at Long Beach.

SiRF'07 Invited Speakers:

Circuits/Applications

Stewart Taylor, *Intel*,
"MIMO Wireless Transceiver RFIC Design"

Ullrich Pfeiffer, *IBM*, "Millimeter-wave Silicon Transceivers for 60 GHz Applications"

Herbert Knapp, *Infineon*,
"77 GHz Automotive Radar Circuits in Silicon"

Devices and Modeling

Peter Zampardi, *Skyworks*,
"Modeling and Performance of Si and SiGe PA"

Jack Pekarik, *IBM*, "RF CMOS Technology"

Process Technology

Pascal Chevalier, *ST Microelectronics*,
"High-Speed SiGe BiCMOS Technologies: 120-nm Status and End-of-roadmap Challenges"

Franck Murray, *Philips Semiconductors*,
"Materials and Technologies for the Development of Highly Integrated Nanosystems and System-in-Package"

Passives/MEMS

P. Blondy, *XLIM – Faculté des Sciences, Limoges, France*,
"High Power Applications of RF-MEMS"

Manos Tentzeris, *Georgia Tech*,
"3D Integration in Organics/Ceramics: A Solution for Miniaturized Passives and MEMS for Multiband RF Modules"

For further information, visit the SiRF07 website at <http://www.ece.wisc.edu/sirf07/>

INFORMATION ABOUT LONG BEACH

Long beach is the second largest city in the Los Angeles basin, after Los Angeles itself.

It has a long history as a resort area and grew enormously in the 1900s. Long Beach has a port, which with Los Angeles is the largest on the West Coast. At one time it hosted a Naval base, which is long gone. In 1967 it purchased the cruise liner, Queen Mary. It is a major attraction in the harbor and is open to the public for touring, restaurants, and a hotel. There is also a Russian Submarine docked next to it. The Queen Mary has become the center of the revitalized harbor area, which now includes an outstanding aquarium, recreational areas, restaurants and shops. The downtown area has been upgraded during the past ten years and is now bright and clean and is a pleasant place to walk. The new Pike shopping and entertainment area (named after a 1920's amusement park in the same location) is adjacent to the Convention Center. Directly across from the Convention Center, on the water, is the Rainbow Harbor with its Shoreline Village. It is a pleasant place to visit with shops, good dining, theaters, water taxi rides and docks. If you want to explore the city further, there is a complimentary bus system. Maps are available at the Convention Center and the hotels.

Long beach also has a strong cultural atmosphere, supported by several fine museums including the Museum of Art and the Museum of Latin American Art. The city itself is a living museum of architectural styles from Art Deco to modern with some grand private homes along Ocean Blvd.

Long Beach has much to offer its visitors. Those who attended the MTT-S IMS at Long Beach in 2005 will remember it as an outstanding location.

Plenary Session

Tuesday, January 9, 2007

Chair: Mohammad Madihian, *NEC Laboratories America*

The Plenary session officially opens the 2007 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 Dr. Kiyohito Nagata, speaking on the topic of "Mobile Terminal – Today and Future." The talk will address current mobile service and terminal development competition, terminal platform technology development status, and future technology trend and service direction for mobile terminal business.

- 8:30–8:40 Opening Remarks
Mohammad Madihian, General Chairman, 2007 Radio and Wireless Symposium
- 8:40–8:45 Welcome Address
Nim Cheung, President, IEEE Communications Society
- 8:45–8:50 Welcome Address
Steve Kenney, President, IEEE Microwave Theory & Techniques Society
- 8:50–9:00 Technical Program Overview
Aly Fathy, Technical Program Co-Chair, 2007 Radio and Wireless Symposium
- 9:00–9:45 Featured Plenary Talk: "Mobile Terminal — Today and Future"
Dr. Kiyohito Nagata, NTT DoCoMo



Dr. Kiyohito Nagata is the Vice President and Managing Director of the Product Division, NTT DoCoMo. He received his Bachelor, Master, and Doctor of Communication Engineering degrees from Osaka University, Japan. He joined NTT Laboratories in 1982 and moved to NTT DoCoMo in 1992. Dr. Nagata has worked on the research and development of mobile communications terminals for

NTT analog systems, PDC system, PDC packet system, and W-CDMA experimental system.

He has been engaged in NTT DoCoMo's R&D strategy planning since 1999. He has also directed terminal development activities, such as IMT-2000 terminals, PDC terminals, PHS terminals, and satellite mobile terminals since 2001. Since 2004, he has been responsible for NTT DoCoMo's wireless terminal business planning.

Invited Session

Session: TU2A

Enabling Technologies for the Next Generation Radio and Wireless Networks – I

Chair: Xiaodong Wang, *Columbia University*
Co-Chair: Geoffrey Li, *Georgia Tech*

- TU2A-1 – 10:20 AM
Wireless Sensing Systems: From Ecosystems to Human Systems
D. Estrin, UCLA, Los Angeles, USA
- TU2A-2 – 10:50 AM
Adaptive Wireless Access System Design for Cognitive Radio Networks
V. Bhargava, Univ. of British Columbia, Vancouver, Canada
- TU2A-3 – 11:20 AM
Cognitive Radio Prototype Toward IMT-Advanced Wireless Communication Systems
H. Harada, National Institute of Information and Communications Technology, Yokosuka, Japan



Session: TU3A

Combined Physical and MAC Layer Optimization of Wireless Networks
Chair: John E. Smee, *QUALCOMM Inc.*
Co-Chair: Xiaodai Dong, *University of Victoria*

- 1:00 PM TU3A-1
A Game-Theoretic Approach to Energy-Efficient Modulation in CDMA Networks with Delay Constraints
F. Meshkati¹, A.J. Goldsmith², H.V. Poor¹, S.C. Schwartz¹,
¹Princeton University, Princeton, USA, ²Stanford University, Stanford, USA
- 1:25 PM TU3A-2
Using Diploidy Genetic Algorithm for Dynamic OVFS Code Allocation in WCDMA Networks
M. Karakoc, A. Soke, A. Kavak, *University of Kocaeli, Kocaeli, Turkey*
- 1:45 PM TU3A-3
Genetic Algorithms and Fuzzy Logic for Dynamic Channel Allocation in Cellular Radio Networks
J. An, E.L. Hines, M.S. Leeson, L. Sun, W. Ren, D.D. Iliescu, *University of Warwick, Coventry, UK*
- 2:05 PM TU3A-4
Effects of Handover on Voice Quality in Wireless Convergent Networks
A. Fernandez Duran¹, E. Carrera del Pliego¹, J. Alonso Montes²,
¹Alcatel, Madrid, Spain, ²Universidad Politécnica de Madrid, Madrid, Spain
- 2:25 PM TU3A-5
Optimal Probing of Wireless Error Prone Channels for QoS Enhancements in IEEE 802.16 Wireless MAN
H. Wang, D.P. Agrawal, Q. Zeng, *Univ. of Cincinnati, Cincinnati, USA*

Session: TU4A

RF Front-end Integration
Chair: Sanjay Raman, *Virginia Polytechnic Inst. and State U*
Co-Chair: Yves Baeyens, *Lucent*

- 3:20 PM TU4A-1
Fully-Integrated 0.11 μm CMOS Digital Low-IF DVB-S/S2 Satellite TV Tuner Using a Discrete-Step AGC Loop
A. Maxim, *Silicon Laboratories, Austin, USA*
- 3:45 PM TU4A-2
A UHF CMOS Transceiver Front-end with a Resonant TR Switch
J. Jeon, W.B. Kuhn, *Kansas State University, Manhattan, USA*
- 4:05 PM TU4A-3
Analysis of Receiver Space Diversity Gain for Millimeter-wave Self-heterodyne Transmission Techniques under Two-path Channel Environments
C. Choi, Y. Shoji, H. Ogawa, *National Institute of Information and Communications Technology (NiCT), Yokosuka, Japan*
- 4:25 PM TU4A-4
A Fully-Integrated Single-Conversion SiGe BiCMOS Satellite LNB Front-End Using a Constant-Gain Full-Rate Oscillator
A. Maxim, C. Turinici, M. Gheorge, *Maxim, Portland, USA*
- 4:45 PM TU4A-5
A Low Power Folded RF Front-end with Merged LNA and Mixer for ZigBee/Bluetooth
Y. Hwang, H. Yoo, *Information and Communications University, Daejeon, Korea*

Session: TU3B

Advanced Signal Generation Techniques
Chair: Earl W. McCune, *Panasonic Emerging Adv. RF Lab*
Co-Chair: Chris Hicks, *Naval Air Systems*

- TU3B-1
Active Inductor-Based Oscillator: A Promising Candidate for Low-Cost Low-Power Multi-Standard Signal Generation
C. Lee², R. Mukhopadhyay¹, J. Laskar¹,
¹Georgia Electronic Design Center, Atlanta, United States, ²Samsung RFIC Design Center, Atlanta, United States
- TU3B-2
Novel Optimization Criteria for Loop Filter Design of Type II PLLs
H. Erkens¹, S. Sappok¹, A. Neyer¹, S. Heinen²,
¹RWTH Aachen, Aachen, Germany, ²Infineon Technologies AG, Duisburg, Germany
- TU3B-3
Active Planar Coupled Resonators Replace Traditional High Q resonators in Low Phase Noise Oscillators/VCOs
U.L. Rohde, A.K. Poddar, *Synergy Microwave Corp., Paterson, USA*
- TU3B-4 (1:55 PM)
A Rigorous Phase Noise Analysis of Tuned Ring Oscillators
H. Krishnaswamy, H. Hashemi, *University of Southern California, Los Angeles, USA*
- TU3B-5 (2:15 PM)
Technological Scaling and Minimization of Noise in SiGe HBTs Coupled Mode N-Push Oscillator/VCO
U.L. Rohde, A.K. Poddar, *Synergy Microwave Corp., Paterson, USA*

Session: TU4B

Multiple-Input Multiple-Output (MIMO) Communications I
Chair: Kapil R. Dandekar, *Drexel University*
Co-Chair: Sriram Vishwanath, *University of Texas at Austin*

- TU4B-1
Multiple Antennas and Game Theory
O. Oteri, *Freescale Semiconductor, Austin, United States*
- TU4B-2
Experimental Characterization of Resource Allocation Algorithms in MIMO-OFDM Ad Hoc Networks
N.J. Kirsch, C. Liang, K.R. Dandekar, *Drexel University, Philadelphia, USA*
- TU4B-3
Fast Signal Recovery for Multi-user MIMO-OFDM Uplink with Frequency Offsets
Y. Zeng, A. Leyman, *Institute for Infocomm Research, Singapore, Singapore*
- TU4B-4
Maximized Capacity of Coupled Antennas Based on Multipolar Radiations
T. Lee, Y. Wang, *UCLA, Los Angeles, USA*
- TU4B-5
MIMO Multiuser Precoding System using Weighted MMSE Prefilter and Vector Perturbation
K. Kim¹, J. Zhang², R. Iltis³,
¹Nokia Inc., Irving, USA, ²Motorola, Fort Worth, USA, ³Univ. of California, Santa Barbara, USA

Session: TU3C

Emerging Technologies – I
Chair: Xiaodong Wang, *Columbia University*
Co-Chair: Aly Fathy, *University of Tennessee*

- TU3C-1
OFDM2A: A Centralized Resource Allocation Policy for Multi-hop Cellular Backhaul
O. Oyman, *Intel Corp., Santa Clara, USA*
- TU3C-2
Impulse Radio UWB Positioning System
A. Fujii¹, H. Sekiguchi¹, M. Asai¹, S. Kurashima², H. Ochiai³,
R. Kohno³,
¹Fujitsu Ltd., Atsugi, Japan, ²Fujitsu Component Ltd., Shimogawa, Japan, ³Yokohama National University, Yokohama, Japan
- TU3C-3
A Novel Magnetic Communication System for Wireless Transmission Operating at 14.9 MHz
J. Wang, *CST of America, Wellesley Hills, USA*
- TU3C-4
Technology Roadmap – Implementing Emerging Technologies
J. Litva, *TenXc Wireless, Ottawa, Canada*
- TU3C-5
High-Rate Complex Orthogonal Space-Time Block Codes for High Number of Transmit Antennas
C. Xu¹, Y. Gong², Y. Liang¹,
¹Institute for Infocomm Research, Singapore, Singapore, ²Nanyang Technological University, Singapore, Singapore

Session: TU4C

UWB and Antenna Techniques
Chair: Ahmad Hoorfar, *Villanova University*
Co-Chair: Mehdi Shadaram, *University of Texas at San Antonio*

- TU4C-1
Indoor Location Positioning of Non-Active Objects Using Ultra-Wideband Radios
W. C. Headley, C. R. da Silva, R. M. Buehrer, *Virginia Polytechnic Institute and State University, Blacksburg, USA*
- TU4C-2
Adaptive Threshold for TR Pulse Cluster Systems
X. Dong, L. Jin, *University of Victoria, Victoria, Canada*
- TU4C-3
Localization of 3-D Near-field Electromagnetic Sources Using C-SPRIT
M. J. Abedin, A. S. Mohan, *University of Technology Sydney (UTS), Sydney, Australia*
- TU4C-4
Design Approach for Integration of Antennas with Electromagnetic Band Gap Structures
G. S. Shaker, S. Safavi-Naeini, *University of Waterloo, Waterloo, Canada*

Join us Tuesday and Wednesday from 3 PM to 5 PM for the Poster Session to be held in the Exhibit Hall. 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 2 PM to 3 PM for setup and closes promptly at 5 PM. Detailed author instructions are available at <http://rawcon.org/rws2007/posterguide.html>.

Poster Session Chair: Luciano Bogleione, *Custom One Design*, email: l.bogleione@ieee.org

Poster Session Co-Chair: Sridhar Kanamaluru, *Herley Industries, Inc.*, email: skanamaluru@ieee.org.

Session P1 Tuesday, 9 January 2007

Poster Session P1

3 PM to 5 PM

Chair: Sridhar Kanamaluru, *Herley Industries, Inc.*

Co-Chair: Luciano Bogleione, *Custom One Design*

- P1-1
Space Vehicle Wireless LAN Coverage Analysis
S. Hwu¹, Y. Loh², C.C. Sham³, ¹*Barrios Technology, Houston, USA*, ²*Jacobs Engineering, Houston, USA*, ³*NASA Johnson Space Center, Houston, USA*
- P1-2
Modeling of a Circuit Using Transmission Line Elements
C.M. Jackson, *Raytheon SAS, El Segundo, USA*
- P1-3
Highly Miniaturized Fractal Antennas
G.S. Shaker, S. Safavi-Naeini, *University of Waterloo, Waterloo, Canada*
- P1-4
Data Fusion In a Multi-Target Radar Sensor Network
H. Shu, Q. Liang, *University of Texas at Arlington, Arlington, USA*
- P1-5
A Ranging System with IEEE 802.11 Data Frames
M. Ciurana, F. Barceló, F. Izquierdo, *Universitat Politècnica de Catalunya (UPC), Barcelona, Spain*
- P1-6
Phased Array of Switched-Beam Elements for Handset Adaptive Antenna
J. Tagapanij¹, C. Phongcharoenpanich¹, P. Akkaraekthalin², M. Krairiksh¹, ¹*Faculty of Engineering and Research Center for Communications and Information Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Thailand*, ²*Faculty of Engineering, King Mongkut's Institute of Technology North Bangkok, Bangsue, Thailand*
- P1-7
A Microstrip Bandpass Filter Using Asymmetrical Stepped-Impedance Resonators for a Wide Upper Stopband Performance
P. Akkaraekthalin, J. Jantree, T. Majaeng, S. Chaimool, *King Mongkut's Institute of Technology North Bangkok, Bangsue, Thailand*
- P1-8
A Dual-band CMOS Front-end for 2.4/5.2 GHz Applications
V.K. Dao, B.G. Choi, C.S. Park, *Information and Communications University, Daejeon, Korea*
- P1-9
Microstrip Array Antenna with Parasitic Elements Alternately Arranged Over Two Layers of LTCC Substrate for Millimeter Wave Applications
T. Seki, K. Nishikawa, I. Toyoda, S. Kubota, *NTT, Yokosuka, Japan*

- P1-10
Evaluation of FPGAs-based Software Radio Beamformers for 3G Wireless
S. Dikmese, A. Kavak, S. Sahin, K. Kucuk, H. Dincer, *University of Kocaeli, Kocaeli, Turkey*
- P1-11
BIBD Based Collision Free MAC Protocols for Wireless Ad-Hoc Networks
P. Camarda, O. Fiume, G. Marraffa, *Politecnico di Bari, Bari, Italy*
- P1-12
An Energy-Efficient MAC Protocol with Lightweight and Adaptive Scheduling for Wireless Sensor Networks
M. Sekine¹, S. Takeuchi², K. Sezaki³, ¹*The University of Tokyo, Tokyo, Japan*, ²*Nokia Japan Co., Ltd., Tokyo, Japan*, ³*The University of Tokyo, Chiba-ken, Japan*
- P1-13
Performance Analysis of a Quadrifilar Helix Antenna Above the Ground Plane
M. Ghanavati¹, A.S. Daryoush², A. Hoorfar³, ¹*California State University Fresno, Fresno, USA*, ²*Drexel University, Philadelphia, USA*, ³*Villanova University, Villanova, USA*
- P1-14
Radiation Characteristics of Integrated Traveling-Wave Antenna Etched on Heavily-High Permittivity Substrate for Size Reduction
F. Kuroki, Y. Takigawa, S. Kashihara, *Kure Nat'l College of Tech., Kure, Japan*
- P1-15
4x4 MIMO Experimental Test-bed using COTS at ISM Band
R.C. Spring, L. Zhou, N. Gogate, A.S. Daryoush, *Drexel University, Philadelphia, USA*
- P1-16
Genetic Algorithm Optimization of a CPW-fed On-Chip Slot Loop Antenna on Photonic Crystal Substrate Using Silicon Micromachining
H. Sedaghat-Pisheh^{1,2}, M. Naghshi², J. Rashed-Mohassel¹, M. Shahabadi², H. Aliakbarian², F. Razavi³, ¹*Thin Film Lab., Tehran, Iran*, ²*Microwave and Photonics Research Lab., Tehran, Iran*, ³*UCLA, Los Angeles, USA*
- P1-17
A Reconfigurable RF Front-end Based on Varactor Controlled Interstage Matching
S. Shin, J. Kim, H. Yoo, *Information and Communications University, Daejeon, Korea*

RUMP SESSION

ULTRA-WIDEBAND: MARKETPLACE ARRIVAL

Tuesday, January 9, 2007

TIME TBD

Moderators:

Roger Kaul, *Johns Hopkins University*

Gregory Lyons, *MIT Lincoln Laboratory*

Ultra-wideband (UWB) technology is entering the marketplace in several forms following FCC approval in February 2002. The low power spectral density and multiple GHz of bandwidth have enabled a variety of applications including high-data-rate short-range communications, high-range-resolution short-range radars, and accurate location schemes. Five speakers from industry will begin the session with presentations on the development, implementation, and arrival into the marketplace of these UWB applications. The second half of the session will be open for questions from the audience.

Speakers to include:

WiMedia UWB Solution for Worldwide Commercial Deployment, **Dr. Roberto Aiello**, *Staccato Communications & WiMedia Alliance*

UWB for Consumer Electronics, *Freescale Semiconductor*

Safety Through Surveillance – UWB Radar as Key to Increasing Road Safety, **Dr. Ian Gresham**, *MA-COM*

UWB RFID & Location for Safety, *Multispectral Solutions*

UWB Thru-Wall Imaging, *Time Domain*

STUDENT PAPER CONTEST

RWS 2007 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>.

Social Events

- Complimentary Daily Breakfast**
Place: LBCC
Time: 7:00 AM–8:30 AM
- Complimentary Daily Lunch**
Place: Exhibit Hall
Time: 12:00 PM–1:00 PM
- Complimentary Daily Coffee Breaks**
Place: Exhibit Hall
Time: 9:35 AM–10:20 AM and 2:35 PM–3:20 PM
- Exhibitor Sponsored Reception**
Place: Exhibit Hall
Time: 5:00 PM–7:00 PM, Tuesday, 9 January, 2007
- RWS Banquet (Cocktail followed by Dinner)**
Place: Hyatt Regency Long Beach
Time: 6:00 PM–9:00 PM,
Wednesday, 10 January, 2007
Price: \$35 (before 25 November)
\$45 (after 25 November)

Exhibition floor open 9 AM to 7 PM so schedule some time in between sessions and during the Exhibitor Sponsored Reception in the Exhibit Hall to look at the latest wireless technologies (children under the age of 14 will not be admitted to the exhibition hall at any time).

WEDNESDAY, JANUARY 10, 2007

Session: WE1A

CMOS RFIC Technologies

Chair: Noirharu Suematsu, *Mitsubishi Electric*
Co-Chair: Chiang Norman, *Teledyne Microwave*

- 8:00 AM WE1A-1
Millimeter-wave CMOS Voltage-Controlled Oscillators
C. Cao, E. Seok, K.K. Oh, *University of Florida, Gainesville, USA*
- 8:25 AM WE1A-2
A 10 GHz 0.11 μm CMOS Varactorless LC-VCO for Multi-Standard 802.11a/b/g WLAN Using High Resolution Frequency Calibration
A. Maxim, *Maxim, Portland, USA*
- 8:45 AM WE1A-3
A Fully Integrated 1.2 V, 2.4 GHz CMOS RF Transceiver for Low Power WPAN
I. Kwon¹, S. Song², J. Ko², Y. Eo², K. Choi¹, *¹Samsung Advanced Institute of Technology, Yong-in, Korea, South, ²KAIST, Daejeon, Korea, South, ³Kwangju University, Seoul, Korea, South*
- 9:05 AM WE1A-4
A Switched Gain Low Noise Amplifier for Ultrawideband Wireless Applications
C. Wu¹, A. Yen², Y. Cheng¹, J. Chang¹, *¹UMC, Hsinchu, Taiwan, ²UMC, Sunnyvale, USA*
- 9:25 AM WE1A-5
A Fully-Integrated Low-Power 3.1–10.6 GHz UWB LNA in 0.18 μm CMOS
H. Xie¹, X. Wang¹, A. Wang¹, Z. Wang², C. Zhang², *¹Illinois Institute of Technology, Chicago, USA, ²Tsinghua University, Beijing, China*

Invited Session

Session: WE2A

Enabling Technologies for the Next Generation Radio and Wireless Networks – II

Chair: Aly Fathy, *Univ. of Tennessee*
Co-Chair: Xiaodong Wang, *Columbia Univ.*

- 10:20 AM WE2A-1
Performance of MIMO Techniques to Achieve Full Diversity and Maximum Spatial Multiplexing
E.A. Ayanoglu, *University of California, Irvine, Irvine, USA*
- 10:50 AM WE2A-2
A 5 GHz, 108 Mb/s 2x2 MIMO CMOS Transceiver
Y. Palaskas¹, A. Ravi¹, S. Pellerano¹, B.R. Carlton¹, M.A. Elmala¹, R. Bishop¹, G. Banerjee¹, R. Nicholls¹, S. Ling², P. Seddighrad¹, S. Suh³, S.S. Taylor¹, K. Soumyanath¹, *¹Intel Corp., Hillsboro, USA, ²Intel Corp., Folsom, USA, ³Intel Corp., Santa Clara, USA*
- 11:20 AM WE2A-3
Implementing CDMA Reverse Link Interference Cancellation
J.E. Smee, J. Hou, J.B. Soriaga, *QUALCOMM Inc., San Diego, USA*

Exhibition floor open 9 AM to 5 PM so schedule some time in between sessions to look at the latest wireless technologies (children under the age of 14 will not be admitted to the exhibition hall at any time).

Session: WE1B

Advanced Modem Design for Wireless Communications

Chair: John Smee, *QUALCOMM Inc.*
Co-Chair: Mohammad Khojastepour, *NEC Labs*

- WE1B-1
Blind Sensing Algorithms for Cognitive Radio
P. De, Y. Liang, *Institute Infocomm Research, Singapore, Singapore*
- WE1B-2
Multicanonical Simulation of Communication Systems
X. Dong, *University of Victoria, Victoria, Canada*
- WE1B-3
A Low Complexity Decoding Algorithm for Turbo Product Codes
C. Xu, Y. Liang, W. Leon, *Institute for Infocomm Research, Singapore, Singapore*
- WE1B-4
Complexity Reduction for DRM System Using Time Domain Preprocessing
A. R. Ali, A. S. Omar, *University of Magdeburg, Magdeburg, Germany*
- WE1B-5
Robust QR Decomposition Based Blind Equalizers
P. De, B. Shah, *Institute Infocomm Research, Singapore, Singapore*

2007 RWS Technical Program Committee

Antennas

Chair: Ahmad Hoorfar
Silvio Barbin
Ahmed Kishk
Abbas Omar
Safieddin Safavinaeini
Manouchehr Ghanevati
Harris "Chip" Moyer
Weesang W. Park
Hiroshi Shirai

Emerging Technologies

Chair: Qinghua Li
Dajana Cassioli
Yongfang Guo
Qiang Li
Huaping Liu
Helen K. Pan
Chris Yu
Zhi Ning Chen
Cyril D. Iskander
Xintian Eddie Lin
Qian Ma
Brian M. Sadler

Front-End Electronics

Chair: Walter De Raedt
Yves Baeyens
Tatsuo Itoh
Dev Palmer
Sanjay Raman
Xiangdong Zhang
Debabani Choudhury
Jenshan Lin
Jeff Pond
Soheil Tofighi

MIMI Technologies

Chair: Kapil Dandekar
Anand Dabak
David Love
Vijay Nair
Narayan Prasad
Liuqing Yang
Syed Jafar
Angel Lozano
Jeffery Nie
Sriram Vishwanath
Jeff Zhuang

Session: WE1C

Bi(CMOS) and System on Substrate Techniques

Chair: Hiroshi Kondoh, *Hitachi*
Co-Chair: George Heiter, *Heiter Microwave Consulting*

- WE1C-1
Wide Band Room Temperature 0.35-dB Noise Figure LNA in 90-nm Bulk CMOS
L. Belostotski, J. W. Haslett, *University of Calgary, Calgary, Canada*
- WE1C-2
Ultra-Low-Loss and Broadband Micromachined Inductors and Transformers for 30-100 GHz CMOS RFIC Applications by CMOS-Compatible ICP Deep Trench Technology
J. Chang, Y. Lin, C. Chen, C. Chen, P. Yeh, P. Huang, T. Wang, S. Lu, *National Chi-Nan University, Puli, ROC*
- WE1C-3
Linear Transmitter Architecture Using BAW Filter
P. Bar^{1,2}, A. Giry², I. Higon², F. Dumont³, D. Cros¹, P. Ancey², J. Carpentier², *¹XLIM Research Institute, Limoges, France, ²STMicroelectronics, Crolles, France, ³STMicroelectronics, Tours, France*

- WE1C-4
24GHz FMCW Radar Front-End System on Substrate
Z. Li, K. Wu, *Poly Grames Research Center, Montreal, Canada*

RF/Analog ICs

Chair: Noirharu Suematsu
Norman Chiang
Syed Islam
Kenjiro Nishikawa
Satoshi Satoshi
Herbert Zirath
Mohamed Essaaidi
Victor Lubecke
Vesna Radisic
Hei Wang

Signal Generation/Power Amplification

Chair: Chang-Ho Lee
Genevieve Baudoin
Marc Franco
Gamal Hegazi
Al Katz
Earl Mccune
Chul Soon Park
Amin Ezzeddine
Fadel Ghannouchi
Chris Hicks
Hiroshi Kondoh
Jan-Erik Mueller
Andre Van Bezooijen

Wireless Communication Systems

Chair: John Smee
Nallanathan Arumugam
Stefano Buzzi
Huaiyu Dai
Xiaodai Dong
Mohammad A. Khojastepour
Murat Uysal
Guosen Yue
Alexei Ashikhmin
Shuguang (Robert) Cui
Tim Davidson
Thomas Kaiser
Ben Lu
Gregori Vazquez

Wireless Sensors/Ad Hoc Networks

Chair: Clemens Ruppel
Gerhard Fischerauer
Sudharman K. Jayaweera
Seung-Jun Kim
Faranak Nekoogar
Mehdi Shadaram
Qing Zhao
Jackie Hines
Victor Kalinin
Ryszard Lec
Hiarong Qi
Robert Weigel

W E D N E S D A Y , J A N U A R Y 1 0 , 2 0 0 7

Session: WE3A

Novel Antennas

Chair: Ahmed Kishk, *Univ. of Mississippi*
Co-Chair: Harris Moyer, *HRL Labs*

- 1:00 PM WE3A-1
Near-Earth Performance Analysis and Optimization of Miniaturized Planar Antennas
K. Sarabandi, D. Liao, *The University of Michigan, Ann Arbor, USA*
- 1:25 PM WE3A-2
A Technique for Realizing Compact Arrays of Microstrip Antennas
G.S. Shaker, S. Safavi-Naeini, *University of Waterloo, Waterloo, Canada*
- 1:45 PM WE3A-3
Miniaturization of Top-Loaded Monopole Antennas using Peano-Curves
J.A. McVay, A. Hoorfar, *Villanova University, Villanova, USA*
- 2:05 PM WE3A-4
Low Cost Antennas for Collision Avoidance Radar Sensors
S. Lin, S. Gigoyan, J. Wilson, A.E. Fathy, *Univ. of Tenn, Knox, Knoxville, USA*
- 2:25 PM WE3A-5
An Ultra-Wideband Bidirectional Antenna with Modified Circular Disc Monopole Excited Elliptical Ring
K. Chawanonphithak¹, C. Phongcharoenpanich¹, S. Kosulvit¹, M. Krairiksh¹, ¹*King Mongkut's Inst. of Tech. Ladkrabang (KMUTL), Ladkrabang, Thailand*, ²*Nakhon Ratchasima Rajabhat Univ. (NRRU), A. Muang Nakhon Ratchasima, Thailand*

Session: WE4A

Linearity Enhanced Power Amplifiers

Chair: Chang-Ho Lee, *Samsung RFIC Design Center*
Co-Chair: Gamal M. Hegazi, *Government Systems*

- 3:20 PM WE4A-1
Doherty Linear Power Amplifiers for Mobile Handset Applications
B. Kim, J. Nam, D. Yu, *Postech, Pohang, Korea*
- 3:45 PM WE4A-2
Efficient Power Amplifier Identification Using Modified Parallel Cascade Hammerstein Models
M.E. Gadringer, D. Silveira, G. Magerl, *Vienna University of Technology, Vienna, Austria*
- 4:05 PM WE4A-3
A Combined PAPR Reduction and Predistorter Scheme for OFDM Systems in Nonlinear Channels
M. Cheong, H. Määttänen, S. Werner, S. Häggman, *Helsinki University of Technology, Espoo, Finland*
- 4:15 PM WE4A-4
Using the Pilot Frequency from a Positive Feedback Pilot System to Improve Second Loop Convergence for a Feedforward Amplifier
R.N. Braithwaite, *Powerwave Technologies, Santa Ana, USA*
- 4:35 PM WE4A-5
A Linearity-enhanced Compact Series-type Doherty Amplifier Suitable for CDMA Handset Applications
C. Koo¹, U. Kim¹, J. Jeon¹, J. Kim², Y. Kwon¹, ¹*Seoul National Univ., Seoul, Korea*, ²*Avago Technologies, Seoul, Korea*

Session: WE3B

Convergence and Competition on the Way Toward 4G

Chair: George Heiter, *Heiter Microwave Consulting*
Co-Chair: Clemens Ruppel, *EPCOS AG*

- WE3B-1
Convergence and Competition on the Way Toward 4G: Where are We Going?
F. Ivanek, *Stanford University, Stanford, USA*
- WE3B-2 (1:15 PM)
Mobile Network Evolution Beyond 3G
S. Chia, *Vodafone, Walnut Creek, USA*
- WE3B-3 (1:35 PM)
Municipal Broadband – The Evolution of Next Generation Wireless Networks
C. Reinwand, *EarthLink, Inc., Atlanta, USA*
- WE3B-4 (1:55 PM)
Universal Broadband Access, on the Way Forward to 4G
P.P. Sehier, *Alcatel, Velizy, France*
- WE3B-5(2:15 PM)
The Evolution to Wireless Broadband
J. Hoadley, *Nortel, Richardson, USA*

Session: WE4B

Concepts and Development of Wireless Sensor System

Chair: Mehdi Shadaram, *Univ. of Texas at San Antonio*
Co-Chair: Clemens Ruppel, *EPCOS AG*

- WE4B-1
Ultra Miniaturized 24 GHz Wireless Sensor Nodes – A Concept Study and First Results
G. Boeck, S. von der Mark, M. Huber, *TU Berlin, Berlin, Germany*
- WE4B-2
Lifetime-Aware Hierarchical Wireless Sensor Network Architecture with Mobile Overlays
M. Soltan, M. Maleki, M. Pedram, *University of Southern California, Los Angeles, USA*
- WE4B-3
Performance Impact of IQ Mismatch in Direct-conversion MIMO OFDM Transceivers
T.C. Schenk, E.R. Fledderus, P.F. Smulders, *Eindhoven Univ. of Technology, Eindhoven, The Netherlands*
- WE4B-4 (4:25 PM)
Time Synchronization in Network-Centric Sensor Networks
S.D. Raje, Q. Liang, *Univ. of Texas at Arlington, Arlington, USA*
- WE4B-5 (4:45 PM)
Cooperative Transmit Diversity Utilizing Superposition Modulation
K. Ishii, *Kagawa-Univ., Takamatsu, Japan*

Session: WE3C

Emerging Technologies – II

Chair: Mohammad Madhian, *NEC Labs*
Co-Chair: Aly Fathy, *Univ. of Tennessee*

- WE3C-1
Optimal Carrier Frequency of Non-contact Vital Sign Detectors
C. Li, J. Lin, *University of Florida, Gainesville, USA*
- WE3C-2
Compact Bandpass Filter for Ultra-Wideband Communication
P. Mondal, A. Chakrabarty, *Indian Institute of Technology, Kharagpur, Kharagpur, India*
- WE3C-3
Tracking Phaselock Loop Characteristics with a VCO Using a Barium Strontium Titanate (BST)Thin-Film Varactor
A.M. Victor^{1,2}, J. Nath¹, K.G. Gard², M.B. Steer², J. Maria², A.I. Kingon², ¹*Harris Corp., Morrisville, USA*, ²*NC State Univ., Raleigh, USA*
- WE3C-4
A Cache Based Traffic Regulator for Improving Performance in IEEE 802.11s based Mesh Networks
N.S. Nandiraju, D.S. Nandiraju, L. Santhanam, D.P. Agrawal, *Univ. of Cincinnati, Cincinnati, USA*
- WE3C-5
Internet Multimedia Service Delivery to Rural and Remote Areas Implemented with Digital Television Infrastructure
D.W. Prendergast, Y. Wu, C. Nadeau, G. Gagnon, *Communications Research Center, Ottawa, Canada*

Session: WE4C

Air-interface and Beamforming Techniques

Chair: Narayan Prasad, *NEC Laboratories America*
Co-Chair: Aly Fathy, *University of Tennessee*

- WE4C-1
Constrained Clipping for Crest Factor Reduction in Multiple-user OFDM
C. Zhao¹, R. J. Baxley¹, G. Zhou¹, D. Boppana², J. Kenney¹, ¹*Georgia Tech, Atlanta, USA*, ²*Altera Corporation, San Jose, USA*
- WE4C-2
A Crest Factor Reduction Technique for W-CDMA Polar Transmitters
J. Chen, J. S. Kenney, *Georgia Institute of Technology, Atlanta, USA*
- WE4C-3
A Low Feedback Scheme for WMAN MIMO Beamforming
Q. Li¹, G. Li², X. E. Lin¹, S. Zheng², ¹*Intel Corporation, Santa Clara, USA*, ²*Intel Corporation, Beijing, China*

Join us Tuesday and Wednesday from 3 PM to 5 PM for the Poster Session to be held in the Exhibit Hall. 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 2 PM to 3 PM for setup and closes promptly at 5 PM. Detailed author instructions are available at <http://rawcon.org/rws2007/posterguide.html>.

Poster Session Chair: Luciano Boglione, *Custom One Design*, email: l.boglione@ieee.org

Poster Session Co-Chair: Sridhar Kanamaluru, *Herley Industries, Inc.*, email: skanamaluru@ieee.org.

Session P2 Wednesday, 10 January 2007

Poster Session P2

3 PM to 5 PM

Chair: Luciano Boglione, *Custom One Design*

Co-Chair: Sridhar Kanamaluru, *Herley Industries, Inc.*

P2-1
A Low Jitter, Wideband Frequency Synthesizer with Process Tolerant Auto-calibration Technique

S.A. Ali, M. Margala, *Univ. of Rochester, Rochester, USA*

P2-2
High-Coupling and Ultra-Low-Loss Interlaced Stacked Transformers for 60–100 GHz CMOS RFIC Applications

Y. Lin, C. Chen, C. Chen, P. Yeh, *National Chi-Nan Univ., Puli, Taiwan, R.O.C.*

P2-3
Analysis and Measurement of Self Mixing of Transmitter Leakage in WCDMA Receivers.

S.K. Mohammed¹, N.K. Yanduru², ¹*Texas Instruments (India) Pvt. Ltd., Bagmane Tech Park, C.V. Raman Nagar, Bangalore, India*, ²*Texas Instruments, Dallas, USA*

P2-4
Choice and Implementation of a Reed-Solomon Code for Low Power Systems

L. Biard, D. Noguet, *CEA-Leti, Grenoble, France*

P2-5
Minimization of Bias-Induced Memory Effects in UHF Radio Frequency High Power Amplifiers with Broadband Signals

M.J. Franco¹, A. Guida¹, A. Katz², P. Herczfeld³, ¹*Linearizer Technology, Inc., Hamilton, USA*, ²*The College of New Jersey, Ewing, USA*, ³*Drexel Univ., Philadelphia, USA*

P2-6
Increase of Reverse Link Capacity of a 3G CDMA Network by Mobile Transmit Diversity

S.J. Wang, H. Harel, *Magnolia Broadband, Inc., Bedminster, USA*

P2-7
60 GHz Amplifier MMICs and Module for 60 GHz WPAN System

W.J. Chang, J.W. Lim, H.K. Ahn, H. Kim, *ETRI, Daejeon, South Korea*

P2-8
Feedback Requirements for Greedy Interference Avoidance

C. Lacatus, D.C. Popescu, *Univ. of Texas at San Antonio, San Antonio, USA*

P2-9
Link Adaptation Mechanism Based on Cross Layer Design for MIMO Systems

W. Ajib¹, J. Frigon², D. Haccoun², ¹*Universite de Quebec a Montreal, Montreal, Canada*, ²*Ecole Polytechnique de Montreal, Montreal, Canada*

P2-10
Study of the Output Load Mismatch Effects on the Load Modulation of Doherty Power Amplifiers

O. Hammi¹, J. Sirois², S. Boumaiza¹, F.M. Ghannouchi¹, ¹*Radio Laboratory/Electrical and Computer Engineering, Calgary, Canada*, ²*Freescale Semiconductor, Tempe, USA*

P2-11
Modified Hermite Function Based Pulse Shaping Algorithm for Ultra-Wideband Communications

X. Wu, X. Sha, N. Zhang, *Harbin Institute of Technology, Harbin, China*

P2-12
A Novel Fast Algorithm for Multiuser Detection in Long Code CDMA System

P. De, E. Manuel, *Inst. Infocomm Research, Singapore, Singapore*

P2-13
Planning and Sizing Tool for WiMAX Networks

M. Molina-García, J.I. Alonso, *Universidad Politécnica Madrid, Madrid, Spain*

P2-14
Modeling and Simulation of a Hybrid Wireless/Optical Network in Support of Training, Testing and Range Instrumentation

J. Dorleus, R. Holweck, Z. Ren, H. Li, H. Cui, *Stevens Institute of Technology, Hoboken, United States*

P2-15
Data Acquisition for Digital-Controlled Adaptive Analog Predistortion of a Power Amplifier

R.N. Braithwaite, S. Carichner, M.J. Hunton, *Powerwave Technologies, Santa Ana, USA*

P2-16
Forward Modeling of Through-Wall-Sensing with Ultra-Wideband Signals using Finite-Difference Time-Domain Method

X. Huang¹, P. Lee¹, B. Chen¹, H. Cui¹, R. Pastore², ¹*Stevens Institute of Technology, Hoboken, USA*, ²*US Army CECOM-RDEC, Ft. Monmouth, USA*

P2-17
Digitally Optimised Delta-Sigma Modulator for WiMAX Transmitter Design

M. Helou^{1,2}, N. Demirel^{2,3}, R. Negra¹, S. Boumaiza¹, E. Kerhervé², A. Ghazel¹, F.M. Ghannouchi¹, ¹*Univ. of Calgary, Calgary, Canada*, ²*Bordeaux Univ., Bordeaux, France*, ³*École Supérieure des Communications de Tunis, Ariana, Tunisia*

**SYMPOSIUM BANQUET
HYATT REGENCY LONG BEACH**

Wednesday, January 10, 2007

Reception: 5:45 PM; Dinner: 7:00 PM

Join us for the Radio and Wireless Symposium Banquet featuring Student Competition Award Presentation. The RWS Banquet will feature a three-course dinner with complimentary drink service, and will be preceded by a cocktail reception at the Hyatt Regency Long Beach. Admission to the RWS Banquet is open to all attendees and their guests at a modest cost. Tickets to the Banquet can be conveniently purchased through the RWS registration website and on-site.

STUDENT PAPER CONTEST

RWS 2007 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>.



THURSDAY, JANUARY 11, 2007

Session: TH1A

RFIC Technologies for Wireless Transceivers

Chair: Kenjiro Nishikawa, *NTT*

Co-Chair: Aly Fathy, *The University of Tennessee*

- 8:00 AM TH1A-1
High Speed Direct Digital Synthesis for Next Generation RF Systems
K. R. Elliott, *HRL Labs, LLC, Malibu, USA*
- 8:25 AM TH1A-2
A -50 dBc Spur 0.11 μm CMOS Ring Oscillator PLL for DVB-S2 Satellite Receiver SOCs Using a Multi-Regulator Architecture
A. Maxim, R. Poorfard, J. Kao, *Silicon Labs Inc., Austin, USA*
- 8:45 AM TH1A-3
X-band SiGe-MMIC Low Noise Amplifier Using Low Parasitic Capacitance Via Holes for Emitter Grounding
K. Nakajima¹, Y. Yoshida², H. Ueda¹, T. Nishino¹, H. Fukumoto², N. Suematsu¹, *¹Mitsubishi Electric Corp., Kamakura, Japan, ²Mitsubishi Electric Corp., Amagasaki, Japan*
- 9:05 AM TH1A-4
0.4-5.2 GHz SiGe-MMIC Direct Conversion Mixer for Cognitive Radio Receiver
N. Suematsu¹, K. Tsutsumi¹, J. Koide², M. Uesugi², H. Harada³, *¹Mitsubishi Electric Corp., Kamakura, Japan, ²Mitsubishi Electric Corp., Amagasaki, Japan, ³Natl Inst. of Information and Comm. Tech., Hikarino-oka, Japan*
- 9:25 AM TH1A-5
High Performance Mixer with Body Effect Technique
H.S. Kang¹, S.G. Lee¹, B.G. Choi², C.S. Park¹, *¹Information and Communications Univ., Dae Joen, Korea, ²Electronics and Telecommunications Research Institute, Dae Joen, Korea*

Invited Session

Session: TH2A

Enabling Technologies for the Next Generation Radio and Wireless Networks – III

Chair: Geoffrey Li, *Georgia Tech*

Co-Chair: Aly Fathy, *Univ. of Tennessee*

- 10:20 AM TH2A-1
Modern Antenna Designs using Nature Inspired Optimization Techniques: Let Darwin and the Bees Help Designing Your Multi Band MIMO Antennas
Y. Rahmat-Samii, *Univ. of California, Los Angeles, Los Angeles, USA*
- 10:50 AM TH2A-2
Transmitter Performance Characterization with Amplitude and Phase EVM
M. Fitz, *Northrop Grumman Corp., LA, USA*
- 11:20 AM TH2A-3
Next Generation Mobile Broadband Wireless Communications
W. Zhu, *Intel China, Beijing, China*

Session: TH1B

Energy Efficient Wireless Sensor Networks

Chair: Faranak Nekooar, *Univ. of California at Davis*

- TH1B-1
Energy-efficient Geographic Multicast Routing for Error-prone Wireless Sensor Networks
P. M. Ruiz, J. A. Sanchez, *Univ. of Murcia, Murcia, Spain*
- TH1B-2
An Efficiency Degradation Model of Power Amplifier and the Impact Against Transmission Power Control for Wireless Sensor Networks
S. Mikami¹, T. Takeuchi², H. Kawaguchi², C. Ohta², M. Yoshimoto², *¹Kanazawa Univ., Kanazawa, Japan, ²Kobe Univ., Kobe, Japan*
- TH1B-3
A 356 μW , 433 MHz, Rail-to-Rail Voltage Amplifier with Carrier Sensing Function for Wireless Sensor Networks
S. Mikami¹, M. Ichien², T. Takeuchi², H. Kawaguchi², C. Ohta², M. Yoshimoto², *¹Kanazawa Univ., Kanazawa, Japan, ²Kobe Univ., Kobe, Japan*
- TH1B-4
Accurate Wireless Location/Communication System with 22 cm Error Using UWB-IR
K. Mizugaki^{1,2}, R. Fujiwara^{1,2}, T. Nakagawa^{1,2}, G. Ono^{1,2}, T. Norimatsu^{1,2}, T. Terada^{1,2}, M. Miyazaki^{1,2}, Y. Ogata², A. Maeki², S. Kobayashi^{1,2}, N. Koshizuka^{3,2}, K. Sakamura^{3,2}, *¹Hitachi, Ltd., Japan, ²YRP, Japan, ³The Univ. of Tokyo, Japan*
- TH1B-5
UWB Sensor Networks in Hostile Environment: Interference Analysis and Performance Study
L. Wang, Q. Liang, *Univ. of Texas at Arlington, Arlington, USA*

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NEC Laboratories America

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Session: TH3A

Smart Antennas

Chair: Saffaidin Saffavi-Naeini, *Waterloo Univ.*

Co-Chair: Wee-Sang Park, *Pohang Univ. of Science/Tech.*

- 1:00 PM TH3A-1
An Experimental Adaptive Beamforming System for the IEEE 802.16e Downlink
F.W. Vook, *Motorola Labs, Schaumburg, USA*
- 1:25 PM TH3A-2
Beam-switching-Assisted CMA Initialization for Handset Adaptive Antenna
A. Boonpoonga¹, P. Sirisuk², C. Phongcharoenpanich¹, M. Krairiksh¹, ¹King Mongkut's Institute of Technology Ladkrabang, *Ladkrabang, Thailand*, ²Mahanakorn Univ. of Technology, *Nongchok, Thailand*
- 1:45 PM TH3A-3
Wideband Pulse Transmission from Switched Electrically Small Antennas
X. Xu, Y.E. Wang, *Univ. of California, Los Angeles, Los Angeles, USA*
- 2:05 PM TH3A-4
An Efficient CMOS On-Chip Antenna Structure for System in Package Transceiver Applications
M. Nezhad Ahmadi, S. Safavi-Naeini, *Univ. of Waterloo, Waterloo, Canada*
- 2:25 PM TH3A-5
A "Zoom-in" Scanning Array for Wireless Communications
X. Wang, Y.E. Wang, *UCLA, Los Angeles, USA*

Session: TH4A

Building Blocks for Wireless Systems

Chair: Debabani Choudhury, *Intel*

Co-Chair: Walter De Raedt, *IMEC*

- 3:20 PM TH4A-1
Receiver Architectures for Software-defined Radios in Mobile Terminals: The Path to Cognitive Radios
A. Bourdoux, J. Craninckx, A. Dejonghe, L. Van der Perre, *IMEC, Leuven, Belgium*
- 3:45 PM TH4A-2
Liquid Crystal Polymer-based (LCP) Planar Lumped Component Dual-Band Filters For Dual-Band WLAN Systems
A. Bavisli^{1,2}, M. Swaminathan², ¹IBM, *Essex Junction, USA*, ²Georgia Institute of Technology, *Atlanta, USA*
- 4:05 PM TH4A-3
Reconfigurable Filtennas for Multi-Service Wireless Applications
C. Zhang¹, S. Yang¹, H. Pan^{1,2}, A. Fathy¹, S. El-Ghazaly^{1,2}, V.K. Nair^{1,2}, ¹Univ. of Tennessee, *Knoxville, USA*, ²Intel, *Hillsboro, USA*
- 4:25 PM TH4A-4
MEMS-Enabled Dual-band 1.8 and 5–6 GHz Receiver RF Front-end
M. Liu^{1,2}, M. Libois¹, M. Kuijck², A. Barel², J. Craninckx¹, B. Come¹, ¹IMEC, *Leuven, Belgium*, ²Vrije Universiteit Brussel, *Brussel, Belgium*
- 4:45 PM TH4A-5
Design of Serial Parall Connection of Direct Sampling Mixer
Y. Morishita¹, K. Araki¹, Y. Hosokawa², K. Abe², N. Saito², ¹Tokyo Institute of Technology, *Meguro-ku, Japan*, ²Matsushita Electric Industrial Co., Ltd., *Shinagawa-ku, Japan*

Session: TH3B

Air Interfaces for Evolving Wireless Networks

Chair: Mohammad Khojastepour, *NEC Labs*

Co-Chair: Xiaodong Wang, *Columbia University*

- TH3B-1
On the Beyond 3G Evolution of Wireless Cellular Networks
J. Lu, J. Lee, Q. Gao, T. Wu, Y. Yang, Z. Rong, A.C. Soong, *Huawei Technologies Co., Ltd., Plano, United States*
- TH3B-2
Millimeter-wave OFDM WPAN System Applying Adaptive Modulation for Grouped Sub-carriers
Y. Shoji, C. Choi, H. Ogawa, *National Institute of Information and Communications Technology, Yokosuka, Japan*
- TH3B-3
Performance Analysis of Multiband TH-PAM and Multiband-OFDM Ultra Wideband Communications Systems
P. Yaddanapudi, N. Vallepali, D.C. Popescu, *Univ. of Texas at San Antonio, San Antonio, USA*
- TH3B-4
On the Analysis of Using 802.16e WiMAX for Point-to-Point Wireless Backhaul
D.T. Chen, *Motorola Inc., Arlington Heights, USA*
- TH3B-5
An Internally Coded Time-Hopping Spread-Time CDMA Scheme for UWB Systems and its Performance Analysis
M.G. Shayesteh^{1,2}, M. Nasiri-Kenari², ¹Urmia Univ., *Urmia (Ourmieh), Iran*, ²Sharif Univ. of Technology, *Tehran, Iran*

Session: TH4B

Innovative Radio Techniques and Receiver Design

Chair: Xiaodai Dong, *University of Victoria*

Co-Chair: Mohammad Madihian, *NEC Labs*

- TH4B-1
Method for High Precision Clock Synchronization in Wireless Systems with Application to Radio Navigation
S. Roehr^{1,2}, P. Guldenl, M. Vossiek², ¹Symeo GmbH, *Munich, Germany*, ²Clausthal University of Technology, *Clausthal, Germany*
- TH4B-2
Beam Synthesis Method for Beamforming Adaptation in Cognitive Radio Based Wireless Communications Systems
M. H. Islam, Y. Liang, *Institute for Infocom Research, Singapore, Singapore*
- TH4B-3
Signal Distortion Due To Spectral Re-Growth Of Adjacent Channel Interferers in WCDMA Receivers
S. K. Mohammed¹, N. K. Yanduru², ¹Texas Instruments (India) Pvt Ltd, *C.V. Raman Nagar, Bangalore, India*, ²Texas Instruments Inc, *Dallas, USA*
- TH4B-4
A Novel Error Separation Technique for Quadrature Modulators and Demodulators
A. Yamaoka, K. Yamaguchi, *TOSHIBA Corporation, Kawasaki, Japan*
- TH4B-5
A Modulation Classification Using Joint Moments with Linear Transform
D. Shimbo, I. Oka, S. Ata, *Osaka City University, Osaka, Japan*

Session: TH3C

Multiple-Input Multiple-Output (MIMO) Communications II

Chair: Vijay K. Nair, *Intel Corp.*

Co-Chair: Sriram Vishwanath, *University of Texas at Austin*

- TH3C-1
On the Value of Transmitter Information
C. Steger, A. Sabharwal, *Rice Univ., Houston, United States*
- TH3C-2
Expanded Soft Demapper for LDPC Coded GMD-THP MIMO System
C.Y. Peh, Y.C. Liang, *Institute for Infocomm Research, Singapore, Singapore*
- TH3C-3
Low-Complexity Iterative Multiuser Detection and Equalization for Multipath MIMO Coded Systems
T. Ait-Idir^{1,2}, S. Saoudi¹, ¹ENST Bretagne, *Brest, France*, ²INPT, *Rabat, Morocco*
- TH3C-4
Evaluation of Synchronization and Fractionally Spaced Equalization for Multipath MIMO SC-FDE Test-Bed
Q. Cai¹, A. Wilzeck¹, T. Kaiser^{2,1}, ¹Univ. Duisburg-Essen, *Duisburg, Germany*, ²mimoOn GmbH, *Duisburg, Germany*
- TH3C-5
On the Optimality of SPRAS-MIMO for Spatial Multiplexing Transmission
J. Ahmadi-Shokouh¹, S. Jamali^{1,2}, S. Safavi-Naeini¹, ¹Univ. of Waterloo, *Waterloo, Canada*, ²Univ. of Tehran, *Tehran, Iran*

Exhibition floor open 9 AM to 3 PM so schedule some time in between sessions to look at the latest wireless technologies (children under the age of 14 will not be admitted to the exhibition hall at any time).

WORKSHOPS

Sunday Workshops

WS1: UWB OVER FIBER

Sunday, January 7, 2007 — 1:30 PM–5:30 PM

Organizer: Jianping Yao, *Univ. of Ottawa*

Speakers: Y. Le Guennec, *Institut National Polytechnique de Grenoble*; L.C. Ong, *Institute for Infocomm Research*; Qing Wang, *University of Ottawa*; A.M. Weiner, *Purdue Univ.*; T. Kawanishi, *NICT*

Ultra-wideband (UWB), regulated by the Federal Communications Commission (FCC) for indoor and handheld UWB systems operating in the frequency range from 3.1 to 10.6 GHz with an effective isotropic radiated power level of less than -41 dBm/MHz, has recently attracted considerable interests for short-range high-throughput wireless communication and sensor networks thanks to their intrinsic properties, such as the immunity to multipath fading, extremely short time duration, carrier free, low duty cycle, wide bandwidth, and low power spectral density. However, by wireless transmission, UWB signals are only limited to short distance of a few to tens of meters. Such short-range wireless networks can operate mainly in indoor environments in standalone mode, with a nearly nonexistent integration into the fixed wired networks or wireless wide-area infrastructures. To offer availability of undisrupted service across different networks and eventually achieve high-rate data access at any time and from any place, UWB combined with fiber distribution technology may provide an effective solution. The objective of this special symposium is to introduce the recent developments in the UWB over fiber technologies, including the generation and distribution of UWB signals using photonic technologies and their applications in broadband wireless access networks.

WS2: RF POWER TRANSISTOR AND AMPLIFIER CHARACTERIZATION TECHNIQUES

Sunday, January 7, 2007 — 1:30 PM–5:30 PM

Organizers: John Wood, Basim Noori, *Freescale Semiconductor Inc., RF Division*

Speakers: Basim Noori, *Freescale Semiconductor*; Andrea Ferrero, *Politecnico di Torino*; Johannes Benedikt, *University of Cardiff*; Jan Verspecht, *Jan Verspecht bba*; Paul Tasker, *University of Cardiff*; Michael LeFevre, *Freescale Semiconductor*; Peter Asbeck, Don Kimball, *UC San Diego*

The accurate measurement of the electrical performance of high power RF transistors and power amplifiers presents a number of challenges. The characterization of power transistors for applications in classic reduced conduction angle amplifier modes has for many years been performed by load-pull techniques. And yet as the power density of the transistors increases in response to the absolute power demands of wireless infrastructure amplifier applications, we are faced with significant challenges in maintaining the accuracy of load-pull measurements that are being made close to the edge of the Smith Chart using passive tuners. This challenge has been met with better measurement techniques, as well as the development of a variety of active load-pull techniques. Further, the new capability for making vector-corrected measurements at high powers, using large-signal network analysis methods, has enabled the study and understanding of the nonlinear behavior of the transistor at high powers. The coupling of the large-signal network analyzer with harmonic load-pull techniques has enabled us to control the impedance environment seen by the transistor, and has led to the practical identification and realization of high-efficiency amplifier modes such as Classes E & F, for example. These high efficiency amplifier modes are generally very nonlinear, and linearization or pre-distortion techniques need to be applied. This has resulted in the parallel development of measurement systems of high linearity, bandwidth and dynamic range, for the characterization of linearization techniques in these high power applications.

In this workshop we will highlight the measurement challenges and their solutions in the world of high power RF device and amplifier design, as found in wireless communications base stations, for example. The workshop will cover topics including passive and active load-pull techniques, harmonic terminations, large-signal network analysis, and linearity measurements. The level of the discussion will be appropriate for the newcomer to high power RF transistor and amplifier characterization, as well as seasoned professionals who wish to survey the broad perspective of the available measurement techniques, new and old. Speakers have been drawn from a number of universities who are in the forefront of technological leadership in high power RF device and amplifier characterization. The presentations will cover a range of techniques for characterization, evaluation and verification of high power RF transistors and power amplifiers. Each presentation will be of approximately 30 minutes duration, and if there is time, we shall also have a short panel session at the end of the Workshop, with all presenters in attendance.

Monday Workshops

WM1: NEW TRENDS IN TECHNOLOGY AND DESIGN METHODOLOGY FOR HIGHLY INTEGRATED MMICs AND SYSTEMS ON CHIP

Monday, January 8, 2007 — 8:30 AM–5:00 PM

Organizers: Tsuneo Tokumitsu, *Eudyna Devices Inc.*, Edmar Camargo, *WJ Communications*

Speakers: Fred Schindler, *RFMD*, Noriharu Suematsu, *Mitsubishi*, Michiel Steyaert and Patrick Reynaer, *KU Leuven ESAT-MICAS*, Huei Wang, *National Taiwan Univ.*, Kenjiro Nishikawa, *NTT*, Walter De Raedt, *IMEC*, Osama Shanna, *Maxim*, Nobuyuki Itoh, *Toshiba*

The high levels of integration of MMIC and SoC technology represent an evolution in the world of wireless. The desired integration includes analog and digital control circuits, radio frequency circuits operating from handset frequencies through millimeter-wave frequencies, and high-speed digital signal processing and clocking at operating frequencies up to tens of GHz. The rapid growth of semiconductor technologies will support developments of very highly integrated RF circuit functions on a chip combined with additional functions of a digital and/or an analog nature, but, to date, the majority of the research effort is being done without considering the adequacy of the circuit methodology/technology applied to the various frequencies and applications within the chip. The challenges involved to optimally accomplish these integration objectives are quite complex and involve questions like: What are or should be integrated on a chip? What are the solutions for different frequency bands? How to solve the electromagnetic interference issues caused by the mixing of signals? How to implement tests for these varied functions?

The workshop objective is to bring together experts from different areas to survey the current methodologies/technologies for high MMIC integration and SoC, to discuss advantages and disadvantages, and to assist the participants in gaining a coherent overview on the challenges present and future issues. Though the SoC level integration is pursued, the SiP is an alternative or competing technology for system level integration. Hence, a SiP issue is included in this workshop.

WM2: MIMO: RESEARCH AND IMPLEMENTATION PERSPECTIVES

Monday, January 8, 2007 — 8:30 AM–12:30 PM

Organizer: J. Koshy, *Applied Research, Telcordia Tech*

Speakers: J.C. Liberti, *Advanced Wireless Signal Processing Research, Telcordia Technologies*; B. Daneshmand, *UCLA and Silicus Communication Systems*; K. Higuchi, *NTT DoCoMo*; A. Pidwerbetsky, *Bell Labs, Lucent Technologies*

Nearly a decade after its introduction, Multiple-Input Multiple-Output (MIMO) systems, a key enabling technology for high-performance, high-rate wireless communications, is rapidly moving from the theoretical realm to the practical realm. Using multiple antennas at both ends of the link, MIMO technology exploits the additional dimensions of spatial diversity offering benefits previously not realizable using single antenna links. Benefits include high data-rate communications in limited bandwidths, more robust wireless communications, significant range extensibility, greater security (both from an intercept and detectability standpoint), and adaptation to the changes in the multipath and electromagnetic environment and varying quality of service (QoS) requirements. Today, the application of MIMO technology is being considered for indoor local area networks, cellular multimedia data networks, broadband fixed wireless access, and mobile-to-mobile ad hoc wireless communication networks.

This workshop lectures will cover a wide range of MIMO topics of interest to the seasoned MIMO researcher/practitioner, R&D managers and graduate students exploring research topics. In addition to focusing on the most recent advances and challenges in MIMO technology, each talk will also provide information of a tutorial nature. Distinguished speakers from top industry R&D labs and academic institutions will cover a wide range of topics including MIMO waveforms, open- and closed-loop designs, high-performance iterative signal processing, channel phenomenology, higher layer and multi-user aspects, real-time prototyping and testbed development, antenna configurations exploring polarization diversity, and real-time implementation challenges.

WM3: WIRELESS NETWORKS IN HARSH ENVIRONMENTS – PROPAGATION AND COEXISTENCE

Monday, January 8, 2007 — 1:00 PM–5:00 PM

Organizers: P.T. Kuruganti, W.W. Manges, *Oak Ridge National Lab (ORNL)*; I. Howitt, *Univ. of North Carolina, Charlotte*; A. Fathy, *Univ. of Tennessee*

Speakers:

T. Kuruganti and W. Manges, *ORNL*; I. Howitt, *UNCC*, M. McNerney, *Boeing*; D. Sexton, *GE*; P. Gonia, *Honeywell*; J. Nutaro, *ORNL*; P. Fuhr, *Aprion*; A. Fathy, *UTK*; J. Gutierrez, *Eaton*; J. Cordaro, *Savannah River National Lab*, P. Bandyopadhyay, *GM*; R. Qiu, *Tennessee Tech*

Wireless technology is fueling new paradigms in government, personal, commercial, and industrial communication systems throughout the marketplace. Many companies supplying sensors and instrumentation are coming to the realization that, without a wireless offering, their product line will be very short lived. The industrial community is poised to adopt wireless technology to support technical innovations, e.g., widespread use of wireless sensors forecasted to improve manufacturing production and energy efficiency by 10% and reduce emissions by 15%. Environments like the industrial environment are particularly harsh with interference from metal structures etc. (as found in the manufacturing sector), interference generated during wireless propagation and multipath fading of the RF signal all invite novel mitigation techniques. To illustrate, the nuclear industry has harsh radiations in the hot cells, where the wireless technology will benefit them by avoiding expensive wiring, but the environment is severe for standard wireless networks implementation. However, the challenge in achieving the energy efficiency using wireless is closely coupled with maintaining network Quality of Service (QoS) requirements. Assessment and management of QoS needs to occur, allowing the network to adapt to changes in the RF, information, and operational environments. The capacity to adapt is paramount to maintaining the required operational performance (throughput, latency, reliability and security). The advent of multiple wireless networks in the same frequency band poses a coexistence problem that needs to be addressed. Modeling EM wave propagation in this kind of highly cluttered environment is also a challenge since ray-tracing methods are non-realistic and finite-difference time-domain (FDTD) methods are computationally expensive. The advent of RFID installation in all the industries for supply chain visibility makes it a timely problem to discuss.

This workshop involves presentations describing the issues and challenges in the applications of wireless networks in harsh environments, and promising future technologies. The workshop will highlight the problems of dealing with taxonomy of kinds and respective physics of environments, existing and future novel modeling and simulation techniques for predicting radio channel prior to deployment, standards and standards-related activities, and future directions.

WM4: ELECTROMAGNETIC COMPATIBILITY (EMC) ASPECTS OF WIRELESS TECHNOLOGY AND CELL PHONE PACKAGING

Monday, January 8, 2007 — 8:30 AM–5:00 PM

Organizers: Daniel Hoolihan, *Hoolihan EMC Consulting*, Andrew L. Drozd, *ANDRO Computational Solutions, LLC*, Karl Varian, *Raytheon Co.*

Part I Speakers: Harry Skinner, Mike Schaffer, Anh Dang, Kevin Slattery, *Intel Corp.*, Andrew Drozd, *ANDRO Computational Solutions*

Part II Speakers: Dave Case, *Cisco Systems*, Steve Berger, *TEM Consulting*, Mike Foegelle, *ETS-Lindgren*, Mike Violette, *Washington Labs*, Mark Briggs, *Elliot Labs*

The overall workshop will provide key information on EMI concerns as they pertain to present and future wireless/cellular phone technologies and associated packaging issues. More specifically, this workshop will address the electromagnetic interference (EMI) aspects of the proliferation of modern wireless devices such as current radio and cell phone technologies. It will address both EMI from product to product such as cellular phones, wireless radio devices and packaging, as well as relevant spectrum allocation issues. *Topics to be discussed will include:*

- EMI from licensed cell and wireless transmitters
- EMI for unlicensed cell and wireless transmitters
- Telecom Certification Body (TCB) issues with EMI and wireless/telecommunications devices
- EMI and future wireless and cellular technologies
- International and regulatory aspects of EMI and wireless/cellular devices.

The first part of this workshop will introduce and define the concept of Platform and Cellular Device RF/Microwave Interference. It will include presentations on the concept of RF/microwave EMI for wireless systems including measurement techniques, design methodologies and case studies to establish risks and determine mitigation requirements for platform and device-generated RF/microwave EMI.

The second part of this workshop will address specific device issues particularly as they relate to radiated electromagnetic interference and immunity for modern communications systems including cell devices, as well as the impact of new communications device technologies and dynamic frequency selection. Additional specific case studies will be presented along with a focus on selected wireless/cell technology, EMI packaging considerations, spectrum and laboratory measurement methods.

SHORT COURSES

SF1: RECENT ADVANCES IN ELECTRICALLY SMALL AND RECONFIGURABLE ANTENNAS

Friday, January 12, 2007 — 8:00 AM–12:00 PM

In recent years, there has been a considerable amount of interest in development of electrically small and low-profile multifunction/reconfigurable antenna elements and arrays for both civilian and defense applications. In particular, antenna miniaturization has been the subject of intense investigation over the past decade with the significant commercial growth of wireless devices as well as the emergence of electronic intelligence and digital battlefield, which require electrically small antennas operating in VHF and UHF bands. In addition, extensive efforts are currently underway to develop universal wireless receivers that necessitate design of multi-band, multi-service, and multi-standards antennas. These requirements provide challenging problems for the antenna engineer in optimization and design of the future generation of electrically small and reconfigurable antenna systems.

This short course begins with an overview of the basic theory and concepts associated with electrically small antennas. The presentation provides an understanding of antenna performance limitations in terms of impedance, radiation patterns, bandwidth, efficiency, and quality factor. The presentation continues with a discussion of recent advances in the field of electrically small antenna design. Techniques discussed include dielectric loading, impedance loading, linear loading, top-loading, folded configurations, Genetic Algorithm optimization, etc. The relationship between the antenna's performance characteristics and its physical properties are discussed. This segment concludes with a discussion of recent advances in the design of low profile, conformal and integrated device antennas.

In the second part of the short course, the concept of Reactive Impedance Surface (RIS) as a substrate for planar antennas, that can miniaturize the size and significantly enhance both the bandwidth and the radiation characteristics of an antenna above such substrate, will be presented. A RIS can be tuned anywhere between Perfectly Electric and Magnetic Conductor (PEC and PMC) surfaces offering the unique property to achieve the optimal bandwidth and miniaturization factor. The concept of artificial magnetism using embedded circuit metamaterials will also be presented for both miniaturization of antennas. Design examples using both analytical and numerical simulation verified by experimental results will be presented.

In the third part, the concepts of space-filling curves (SFC), such as Hilbert and Peano curves, will be introduced and their applications in design of self-resonant electrically small anten-

nas and high impedance ground planes will be detailed. These curves offer an attractive technique for antenna miniaturization, since a structure of this shape can be made of an electrically long metallic wire compacted within a very small footprint. The presentation will include applications of SFCs in design of wideband top-loaded monopoles, dual-band PIFA for ISM bands, RFID tags, and EBG surfaces. Design examples include both simulated and experimental results.

In the last part, we discuss the reconfigurable antennas, which would have great potential to provide such versatility in a compact, low cost, and high performance structure. However, they have certain limitations, which include the presence of higher order resonances (spurious resonances) and the need to simultaneously serve multiple services at the same time, but these hurdles can be circumvented. We will evaluate the different design options, present some examples of reconfigurable wireless antennas, and elaborate on their limitations.

Background required for this short course includes: i) Undergraduate-level antenna theory and familiarity with basic antenna terminologies. ii) Undergraduate-level microwave theory and familiarity with impedance matching techniques.

Instructors:

S. Best, *Mitre Corp.*, Fundamentals of Electrically Small Antennas and Their Optimal Design; K. Sarabandi, *Univ. of Michigan, Ann Arbor*, Small Antennas Using EBG/Reactive Surfaces; A. Hoofar, *Villanova Univ.*, Miniaturized Antennas and Ground-planes Using Space-filling Curves; A. Pathy, *Univ. of Tennessee, Knoxville*, Reconfigurable Antennas

SF2: SPECTRUM POLICY AND REGULATION FOR THE R&D WIRELESS ENGINEER

Friday, January 12, 2007 — 8:30 AM–12:30 PM

Spectrum policy and regulatory issues are just as real for the designer of innovative wireless systems as Maxwell's Equations, although they sometimes can be changed given early recognition of problems and adequate lead time. This course will be taught by an engineer and a lawyer who both have long experience in spectrum policy issues and by a manager of an EMC test firm/telecommunications certification body (TCB). The course will show how to see if a new wireless technology raises significant issues under current regulations or not, estimating the complexity of possible regulatory issues that might impact practical use of the technology, and evaluating options for addressing policy issues in parallel with development.

It will also address the importance of designing compliance into new technology just as one would design reliability into a product and not waiting until the eve of production. Finally, it will review the final step of how to get a new wireless system that complies with regulations approved for sale in various markets. It will also discuss ways to participate in the regulatory process and identifying when outside specialized help might be needed.

The first part of the course will review the basic sources of technical regulations for wireless technologies, their original intentions, and trends in present day approaches to policy development. The focus will be on US regulation with examples from other countries mentioned for comparison. Areas covered will be frequency allocations, emission standards, and marketing regulations. Future issues such as cognitive radios, the ongoing controversy of unlicensed vs. licensed use, and public safety interoperability issues will be covered.

The second part of the course will cover what you need to know but missed because you didn't go to law school: How regulations are made. Opportunities to participate in the development of regulations for wireless technologies. How to decide when you may need professional help in participating in policy development. When waivers can be a promising approach for new technologies that generally, but not completely, comply with existing regulations.

The final part of the course deals with wireless systems that are designed to meet existing regulations but must show compliance before they can be marketed. The importance of considering EMC issues throughout system design will be discussed as well as sources for such information. Then options for EMC testing and the procedures for marketing authorization for various countries will be discussed.

Basic knowledge of wireless technology and interest in learning about the broader context of regulatory issues will meet the background required for this short course.

Instructors:

Michael Marcus, *Marcus Spectrum Solutions*, An Introduction to Spectrum Allocations and Wireless Technology Regulations for Engineers; Anne Linton, Esq., *Washington Federal Strategies, LLC*, Finding Applicable Legal Information on Wireless Regulation and Interacting with Regulators such as FCC; Greg Kiemel, *Northwest EMC Inc.*, Designing Equipment to Meet Regulatory Standards and Testing Needed Prior to Marketing

Hotel Info

The RWS 2007 Planning Committee has secured favorable rates for RWW attendees at Long Beach hotels, providing easy access to the Long Beach Convention Center. In order to receive the Symposium rate, please book your accommodations by December 11, 2006. Please note the discounted rates are only available over official Symposium dates. For reservations outside the official dates please contact the hotel directly via telephone.

Contact one of the hotels listed and mention "IEEE RWW 2007" to receive the negotiated room rate. Reservation requests received by hotels after December 11, 2006 will be accepted on a space and rate available basis, and the group rate may not apply.

Hyatt Regency Long Beach – Headquarters Hotel
Room Rate: \$165.00 Single/Double
200 South Pine Avenue
Long Beach, CA 90803
Phone: 1-562-491-1234

The Westin Long Beach
Room Rate: \$165.00 Single/Double
333 East Ocean Blvd.
Long Beach, CA 90802
Phone: 1-562-436-3000

For online booking capabilities at either of these hotels please log onto the RWW 2007 website at: <http://www.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.

Transportation Info

Traveling to/from Airports via taxi or airport shuttle:

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From 405 South and Los Angeles International Airport:

Take the San Diego Freeway (405) South to the Long Beach Freeway (710) South toward Long Beach. At the Freeway split, take the LEFT LANES for Downtown Long Beach/Convention Center. Stay on Shoreline Drive, (DO NOT TAKE Broadway/Civic Center/Pine Avenue exit) follow the signs to: Aquarium/Convention Center/ Pine Avenue. TURN LEFT on Pine Avenue (4th stop light).

From 405 North, John Wayne Airport (Orange County) and Long Beach Airport:

Take the San Diego Freeway (405) NORTH to the Long Beach Freeway (710) South toward Long Beach. At the Freeway split, take the LEFT LANES for Downtown Long Beach/Convention Center. Stay on Shoreline Drive, (DO NOT TAKE Broadway/Civic Center/Pine Avenue exit) follow the signs to: Aquarium/Convention Center/Pine Avenue. TURN LEFT on Pine Avenue (4th stop light).

Getting around while in Long Beach!

It is possible to conquer Long Beach without a car. Catch the convenient Passport shuttle, which runs approximately every 5–10 minutes. It's free in the Downtown area and transports visitors to all of the must-see Long Beach attractions, including the Queen Mary, Aquarium of the Pacific, Shoreline Village, and Pine Avenue. For only 90 cents, the Passport continues your journey to the attractions of Belmont Shore, Alamitos Bay and Cal State Long Beach.

Long Beach is also home to two different water-taxis, each combining a short-harbor cruise with state-of-the-art transportation. The Aquabus is available as your link between selected sites in Rainbow Harbor. Or, hop aboard the new Aqualink catamaran for a swift journey to Alamitos Bay.

If Los Angeles is your destination, the Metro Blue Line is a smart alternative to battling the freeway. Board the Blue Line at the Downtown Long Beach Transit Center. Furthermore, taxis, shuttles, an intricate bus system, as well as several rental car agencies are also available for all of your transportation needs.



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2007 IEEE Radio and Wireless Symposium

January 9-11, 2007 ♦ Long Beach, CA

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Name of Guest For a complimentary badge for exhibits

To register, check the appropriate boxes and enter corresponding fees in the Remittance column.
ONLY PAID ATTENDEES WILL BE ADMITTED TO THE WORKSHOPS AND TECHNICAL SESSIONS.

	IEEE MEMBER	Non-MEMBER	REMITTANCE		IEEE MEMBER	Non-MEMBER	REMITTANCE
Combined PAS, RWS and SiRF Passport	<input type="checkbox"/> \$640	<input type="checkbox"/> \$810	\$ _____	Additional Options			
Student, Retiree, Life Member	<input type="checkbox"/> \$310	<input type="checkbox"/> \$380	\$ _____		Wednesday Night Reception & Banquet	<input type="checkbox"/> \$ 35	<input type="checkbox"/> \$ 35
<i>Includes everything included in the individual registration except SiRF Banquet.</i>				Additional CD-ROM Copy of the Proceedings of RWS Technical Sessions (on-site pick-up only)	<input type="checkbox"/> \$ 35	<input type="checkbox"/> \$ 60	\$ _____
IEEE Power Amplifiers Symposium Registration	<input type="checkbox"/> \$130	<input type="checkbox"/> \$160	\$ _____	RWS Workshops (includes lunch and notes)			
Student, Retiree, Life Member	<input type="checkbox"/> \$ 60	<input type="checkbox"/> \$ 80	\$ _____	WS1 Half Day (PM)	<input type="checkbox"/> \$100	<input type="checkbox"/> \$170	\$ _____
Banquet (Mon.)	<input type="checkbox"/> \$ 35	<input type="checkbox"/> \$ 35	\$ _____	Student, Retiree, Life Member	<input type="checkbox"/> \$ 75	<input type="checkbox"/> \$ 75	\$ _____
Extra PAS Digest	<input type="checkbox"/> \$ 20	<input type="checkbox"/> \$ 35	\$ _____	WS2 Half Day (PM)	<input type="checkbox"/> \$100	<input type="checkbox"/> \$170	\$ _____
<i>Registration fee includes: printed PAS Digest (abstract book), workshop breakfast (Mon., Tues.), box lunch on Monday and PAS reception.</i>				Student, Retiree, Life Member	<input type="checkbox"/> \$ 75	<input type="checkbox"/> \$ 75	\$ _____
IEEE Radio and Wireless Symposium				WM1 Full Day	<input type="checkbox"/> \$150	<input type="checkbox"/> \$220	\$ _____
Technical Sessions (TUE through THU)	<input type="checkbox"/> \$315	<input type="checkbox"/> \$400	\$ _____	Student, Retiree, Life Member	<input type="checkbox"/> \$100	<input type="checkbox"/> \$100	\$ _____
Student, Retiree, Life Member	<input type="checkbox"/> \$155	<input type="checkbox"/> \$185	\$ _____	WM2 Half Day (AM)	<input type="checkbox"/> \$100	<input type="checkbox"/> \$170	\$ _____
Technical Sessions (Single day on TUE, WED or THU)	<input type="checkbox"/> \$165	<input type="checkbox"/> \$205	\$ _____	Student, Retiree, Life Member	<input type="checkbox"/> \$ 75	<input type="checkbox"/> \$ 75	\$ _____
Student, Retiree, Life Member	<input type="checkbox"/> \$ 80	<input type="checkbox"/> \$ 95	\$ _____	WM3 Half Day (PM)	<input type="checkbox"/> \$100	<input type="checkbox"/> \$170	\$ _____
<i>Three parallel technical sessions Tuesday through Thursday.</i>				Student, Retiree, Life Member	<input type="checkbox"/> \$ 75	<input type="checkbox"/> \$ 75	\$ _____
<i>Technical session registration fee includes RWS CD-ROM but no printed digest, admission to industry-hosted events.</i>				WM4 Full Day	<input type="checkbox"/> \$150	<input type="checkbox"/> \$220	\$ _____
The 7th Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems	<input type="checkbox"/> \$300	<input type="checkbox"/> \$375	\$ _____	Student, Retiree, Life Member	<input type="checkbox"/> \$100	<input type="checkbox"/> \$100	\$ _____
Student, Retiree, Life Member	<input type="checkbox"/> \$150	<input type="checkbox"/> \$175	\$ _____	Short Courses			
Banquet (Thurs.)	<input type="checkbox"/> \$ 40	<input type="checkbox"/> \$ 40	\$ _____	SF1	<input type="checkbox"/> \$200	<input type="checkbox"/> \$300	\$ _____
<i>Registration fee includes printed SiRF Digest, SiRF Reception, SiRF Banquet (except Passport purchases), admission to industry-hosted events.</i>				SF1 (Student, Retiree, Life Member)	<input type="checkbox"/> \$150	<input type="checkbox"/> \$150	\$ _____
				SF2	<input type="checkbox"/> \$200	<input type="checkbox"/> \$300	\$ _____
				SF2 (Student, Retiree, Life Member)	<input type="checkbox"/> \$150	<input type="checkbox"/> \$150	\$ _____
				<i>Two parallel half-day workshops on Sunday afternoon. Full-day workshop in parallel with consecutive Monday morning and Monday afternoon half-day workshops.</i>			
				<i>Workshop fee includes printed workshop notes, admission to industry-hosted events.</i>			

If you are not an IEEE Member and wish to take advantage of IEEE Member registration rates, you may, before mailing or faxing this form to enter your registration, call IEEE at 800-678-IEEE or go to <http://www.ieee.org/services/join/> and become an IEEE Member.

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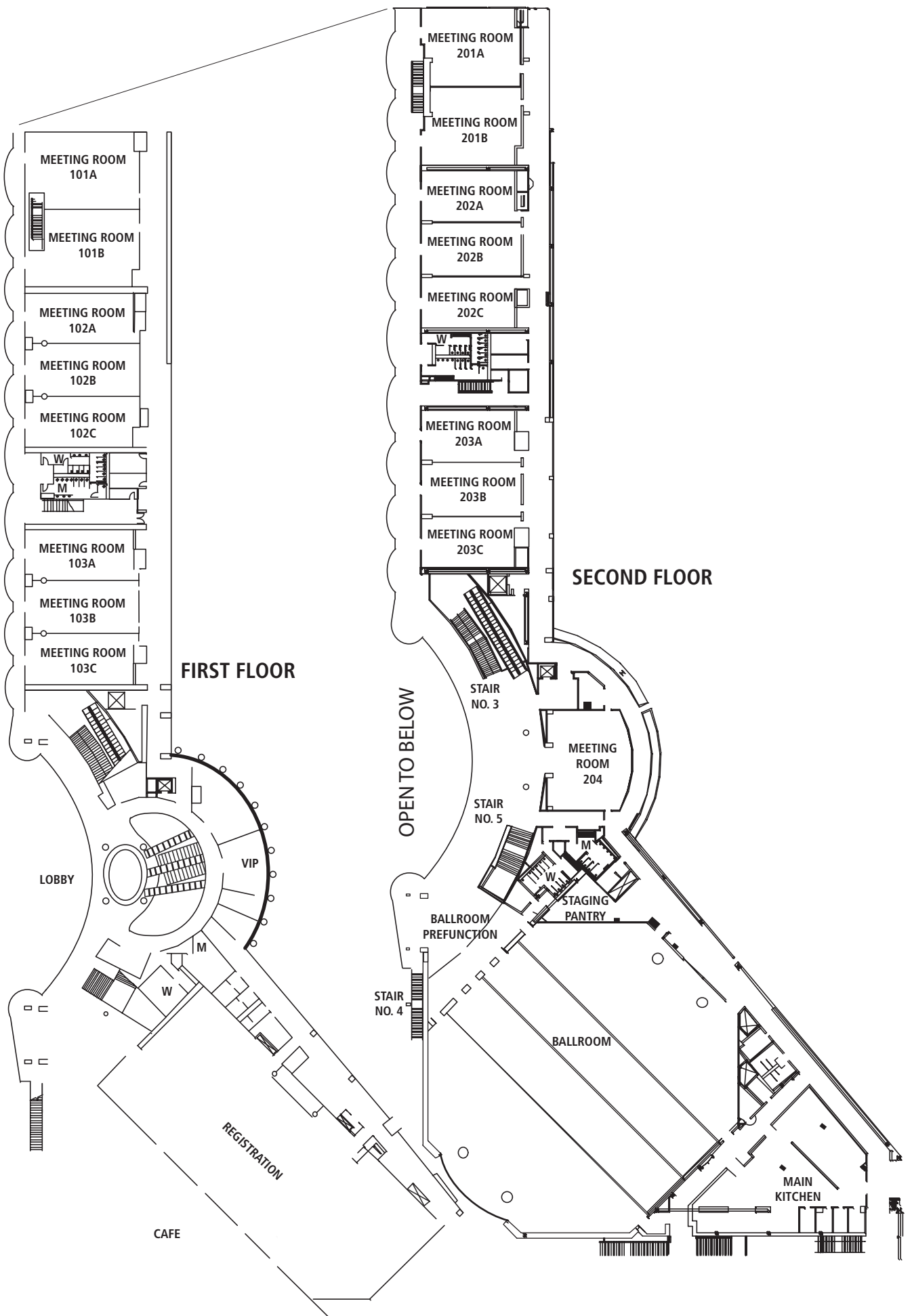
TOTAL REMITTANCE \$ _____

INDIVIDUAL PAYMENT MUST ACCOMPANY FORM

Exp. Date

Written requests for refunds will be honored if received by Nov. 25, 2006.

Long Beach Convention Center



Downtown Long Beach





2007 IEEE Radio and Wireless Symposium

2007 RADIO & WIRELESS WEEK AT A GLANCE

Activity	Location	SUN 1/7				MON 1/8				TUE 1/9				WED 1/10				THU 1/11				FRI 1/12				
		M	N	A	E	M	N	A	E	M	N	A	E	M	N	A	E	M	N	A	E	M	N	A	E	
Breakfast																										
RWS	Workshops																									
	Short Courses																									
	Plenary Session																									
	Technical Sessions																									
	Rump Session																									
	Poster Session																									
	Banquet																									
EXHIBITS	Exhibition																									
	Exhibition Reception																									
	Lunch																									
	Coffee Break																									
PA SYMPOSIUM	Technical Sessions																									
	Poster Session																									
	Reception																									
SiRF	Technical Sessions																									
	Poster Session																									
	Reception/Banquet																									
IMS2007	TPC Meeting																									

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