



**29th IEEE COMPOUND
SEMICONDUCTOR IC
(CSIC) SYMPOSIUM**

Program

Presenting:

Tastes of the Northwest

Oct 14th – Oct 17th, 2007

**Hilton Portland &
Executive Tower
Portland, Oregon, USA**



CO-SPONSORED BY

The IEEE Electron Devices Society,

The IEEE Solid-State Circuits Society and

The IEEE Microwave Theory and Techniques Society

IEEE
445 HOES LANE
PISCATAWAY, NJ 08854

29th IEEE Compound Semiconductor IC (CSIC) Symposium
Oct 14th – Oct 17th, 2007 – Portland, OR, USA
CSIC WWW URL: <http://www.csics.org>

First Class
U.S. Postage
Paid
IEEE
Piscataway, NJ
Permit No. 52

SYMPOSIUM

Hilton Portland & Executive Towers Floor Plan

Saturday, October 13th, 2007

REGISTRATION (Short Course & Primer Course Only)

Sunday, October 14th, 2007

REGISTRATION (Short Course & Primer Course Only)

Continental Breakfast for Short Course

SHORT COURSE 1: Millimeter Wave Imaging: Devices, Circuits and Systems

SHORT COURSE 2: Power Amplifier Technologies and Circuit Techniques

ROCS Workshop (Registration, Workshop, and Coffee Breaks)

ROCS Workshop (Lunch)

Short Course Lunch

REGISTRATION for Symposium (and Primer Course until 4:00)

PRIMER COURSE: Basics of Compound Semiconductor ICs

Symposium Opening Reception

Monday, October 15th, 2007

REGISTRATION

Continental Breakfast

SYMPOSIUM OPENING

SESSION A: Plenary Session

Lunch Break

SESSION B: GaN Devices

SESSION D: High Power Amplifier Technology

PANEL SESSION 1: 100 GbE: market drivers, architecture, technical and economic challenges

Technology Exhibition Opening Reception

Tuesday, October 16th, 2007

REGISTRATION

Technology Exhibition

Continental Breakfast

SESSION F: Building Blocks for mm-Wave and Beyond

SESSION G: Emerging 100 Gb/s Communication Technologies

SESSION H: Amplifier Techniques

SESSION I: mm-Wave and High-Speed CMOS

Exhibition Luncheon

SESSION J: Device Modeling and Characterization

PANEL SESSION 2: High Efficiency Linear PA Techniques for Basestations

Symposium Party – “Tastes of the Northwest”

Wednesday, October 17th, 2007

REGISTRATION

Continental Breakfast

SESSION N: T/R Modules and Switches

SESSION O: High Speed Mixed Signal Circuits

SESSION P: High Performance Frequency Generation

SESSION Q: Advanced Device Technologies

Lunch Break

SESSION R: Front-End Modules and Components

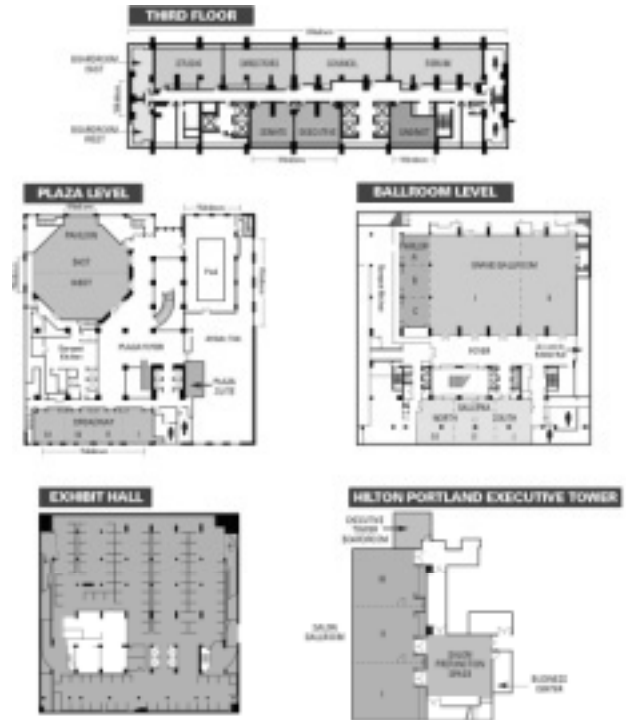
SESSION S: Late News Papers

PANEL SESSION 3: Potential of Future Applications of mm-Wave CMOS: feasibility of 60GHz WLAN/WPAN in CMOS

PANEL SESSION 4: Which Switch Gets Ditched?

Close of Symposium

Visit us on the World-Wide Web at: <http://www.csics.org/>



AT A GLANCE

Saturday, October 13th, 2007

6:00 p.m. – 8:00 p.m. Galleria III

Sunday, October 14th, 2007

7:00 a.m. – 8:00 a.m. Parlors BC
7:00 a.m. – 8:00 a.m. Grand Ballroom II
8:30 a.m. – 3:45 p.m. Galleria North

8:30 a.m. – 3:45 p.m. Grand Ballroom I
8:00 a.m. – 5:00 p.m. Galleria South
12:00 p.m. – 1:30 p.m. Parlors BC
12:00 p.m. – 1:30 p.m. Grand Ballroom II
3:00 p.m. – 8:00 p.m. Grand Ballroom Foyer
4:00 p.m. – 7:00 p.m. Galleria North
6:00 p.m. – 8:00 p.m. Grand Ballroom II

Monday, October 15th, 2007

7:00 a.m. – 5:00 p.m. Grand Ballroom Foyer
7:00 a.m. – 8:00 a.m. Galleries
8:00 a.m. – 8:30 a.m. Grand Ballroom II
8:30 a.m. – 11:00 a.m. Grand Ballroom II
11:40 a.m. - 1:00 p.m. On Your Own
1:00 p.m. – 3:00 p.m. Galleria North
3:30 p.m. – 5:00 p.m. Galleria North
3:30 p.m. – 5:00 p.m. Galleria South

5:30 p.m. – 8:00 p.m. Grand Ballroom I/II

Tuesday, October 16th, 2007

7:00 a.m. – 5:00 p.m. Grand Ballroom Foyer
7:00 a.m. – 4:00 p.m. Grand Ballroom I/II
7:00 a.m. – 8:00 a.m. Grand Ballroom I/II
8:00 a.m. – 9:20 a.m. Galleria North
8:00 a.m. – 9:30 a.m. Galleria South
10:00 a.m. – 11:00 a.m. Galleria North
10:00 a.m. – 11:00 a.m. Galleria South
11:00 a.m. – 1:00 p.m. Grand Ballroom I/II
1:00 p.m. – 2:30 p.m. Galleria North
3:00 p.m. – 4:30 p.m. Galleria South
5:00 p.m. – 10:00 p.m. McMenamins Crystal Ballroom

Wednesday, October 17th, 2007

7:00 a.m. – 12:00 p.m. Grand Ballroom Foyer
7:00 a.m. – 8:00 a.m. Galleries
8:00 a.m. – 9:30 a.m. Grand Ballroom I
8:00 a.m. – 9:20 a.m. Grand Ballroom II
10:00 a.m. – 11:20 a.m. Grand Ballroom I
10:00 a.m. – 11:40 a.m. Grand Ballroom II
11:40 a.m. - 1:00 p.m. On Your Own
1:00 p.m. – 2:20 p.m. Grand Ballroom I
3:00 p.m. – 4:40 p.m. Grand Ballroom II
1:00 p.m. – 2:30 p.m. Grand Ballroom II

3:00 p.m. - 4:30 p.m. Grand Ballroom I
5:00 p.m.

MAIL COMPLETED REGISTRATION FORM AND FEES TO:

Registrar, 2007 IEEE CSIC Symposium
c/o IEEE Conference Management Services
445 Hoes Lane
Piscataway, NJ 08854 USA

Place
Stamp
Here

CHAIRMAN'S MESSAGE

On behalf of the organizing committee and the IEEE Electron Devices Society, the Microwave Theory and Techniques Society, and the Solid-State Circuits Society, I invite you to be a part of the 2007 IEEE Compound Semiconductor IC (CSIC) Symposium. This year's symposium will be held October 14th – October 17th in Portland, Oregon at the Hilton Portland and Executive Tower.

The CSIC Symposium will return to Portland after 20 years. Join us in Portland, not only to familiarize yourself with the state-of-the-art technology development and industry exhibition, but also to see some old friends who you probably met 20 years ago and make new friends by experiencing the beauty, comfort and lifestyle of a city once proclaimed as North America's "Best Big City".

Over the last 29 years, the CSIC Symposium has become the pre-eminent international forum on developments in integrated circuits using compound semiconductors such as GaAs, InP, GaN, SiGe and other materials including CMOS. Coverage embraces all aspects of the technology, from materials issues and device fabrication, through IC design and testing, high volume manufacturing, and system applications. The CSIC Symposium provides the ideal forum to present your latest results in high-speed digital, analog, microwave/millimeter wave, mixed mode, and optoelectronic integrated circuits. First-time papers concerned with the utilization and application of InP, GaAs, SiGe, GaN and other compound semiconductors in military and commercial products are invited.

This year we are offering two short courses for the price of one. They cover current hot topics in advanced semiconductors including mm-Wave Imaging and Power Amplifier Technology. Both will be taught by leading experts from industry and the government. In addition, we offer our Primer Course that is an excellent tutorial presented within the context of our Symposium technical program.

We are providing several social events to allow interaction with colleagues. Events include the Sunday Evening Opening Reception, the Monday evening Technology Exhibition Opening Reception, the Tuesday Technology Exhibition Luncheon, and the Tuesday Theme Party – "Tastes of the Northwest". We also offer daily breakfast and AM/PM coffee breaks Monday through Wednesday.

We hope you will join us and wish you a pleasant stay in Portland.

Mohammad Madihian, Chair
2007 IEEE CSIC SYMPOSIUM



2007 IEEE Compound Semiconductor IC Symposium (CSICS) 14 - 17 October 2007 – Portland, Oregon ADVANCED REGISTRATION FORM



****Cancellation Policy:** All refund requests for those who need to cancel their registration must be made in writing to IEEE CMS and received by 20 September 2007. All cancellations will be subject to a \$50 cancellation fee. Authors who are presenting their papers are not eligible for refunds. **No refunds will be given for requests made after 20 September 2007****

Registrant Information (All Fields marked with an asterisk are required)

First/Personal Name*:	MI:	Family/Sur-Name*:		
Organization/Company Name:		Address*:		
City*:		State/Province:		
Postal Code*:		Country*:		
Telephone No.:		Fax No.:		
Email*:				
IEEE Member Number:	Are you an Author? <input type="checkbox"/> Yes <input type="checkbox"/> No Authors, please list paper number(s):			

Registration Categories

FULL REGISTRATION

Full Symposium Registration includes admission to all Technical Sessions, a Digest, a conference CDROM, daily breakfast & breaks, entrance to Exhibition Reception & Luncheon, one Opening Reception ticket, and one Theme Party Ticket.

	On/Before 20 September	After 20 September	
IEEE Member	\$500	\$550	\$
Non-Member	\$550	\$620	\$
Students	\$220	\$270	\$

ONE DAY REGISTRATION

One Day Registration fee includes admission to Technical Sessions for the selected day. The Digest and social events are NOT included.

	On/Before 20 September	After 20 September	
One Day: IEEE Member	\$270	\$320	\$
One Day: Non-Member	\$320	\$370	\$

Select the Day you will attend:
 Monday Tuesday Wednesday

SHORT COURSE: Sunday, 14 October, 8:30 AM – 3:45 PM

Short Course Registration includes admission to the Short Course and the Short Course Notes.

	On/Before 20 September	After 20 September	
Short Course: Regular	\$370	\$470	\$
Short Course: Student	\$220	\$320	\$

PRIMER COURSE: Sunday, 14 October, 4:00 PM – 7:00 PM

Primer Course Registration includes admission to the Primer Course and the Primer Course Notes.

Primer Course: Regular	\$175	\$
Primer Course: Student	\$75	\$

Extra Purchases (Note: Short Course & Primer Course Only registrants may not purchase tickets for the Opening Reception or Theme Party).

Extra Symposium Opening Reception Ticket	Qty.	@ \$30 = \$	Opening Reception ~ Sunday 14 October
Extra Theme Party Ticket	Qty.	@ \$75 = \$	Theme Party ~ Tuesday 16 October
Technical Digest Hardcopy Only	Qty.	@ \$85 = \$	
Technical Digest CD ROM Only	Qty.	@ \$110 = \$	
Short Course Hardcopy Notes Only	Qty.	@ \$110 = \$	
Short Course CD ROM Only	Qty.	@ \$110 = \$	
Primer Course Notes Only	Qty.	@ \$55 = \$	

Payment	Total Remittance: \$
<input type="checkbox"/> Check (Payable to IEEE/2007 CSICS) <input type="checkbox"/> Visa <input type="checkbox"/> Master Card <input type="checkbox"/> American Express <input type="checkbox"/> Diners Club <input type="checkbox"/> Discover	
Credit Card Number:	Exp. Date:
Cardholder Name:	Authorized Signature: _____

Mail, Fax or Email Completed Registration Form & Fees to: **IEEE CSICS Registrar, c/o Conference Management Services**
 445 Hoes Lane, Piscataway, NJ, 08854 USA
 Tel: +1 732 465 6620; Fax: +1 732 465 6447; Email: csics07reg@ieee.org

CORPORATE BENEFACTORS

This year, we are pleased to continue with the IEEE Compound Semiconductor IC Symposium Corporate Benefactors Program. This program allows companies interested in compound semiconductors to show their support of the Symposium by making contributions towards the cost of some of our social events.

These additional resources enable the Symposium to increase the quality of our event, as well as allowing companies an opportunity for some tasteful promotional activities. To discuss any of the benefactor opportunities in more depth, please contact:

Mohammad Madihian
Tel: +1-609-951-2916
Fax: +1-609-951-2499
E-mail: madihian@ieee.org

As of this printing, the Corporate Benefactors for the 2007 Compound Semiconductor IC Symposium are as follows.

Gold Level Benefactors:

RF MICRO DEVICES, INC.



General Benefactors:

HRL Laboratories LLC

NEC

TriQuint

Special Benefactors:

The Symposium Web Site www.csics.org has become a critical tool for the dissemination of information for prospective attendees of the Symposium. Every year, the web site must be updated and maintained to effectively serve this purpose. We would like to acknowledge the following benefactor for providing the Symposium web site support for the 2007 CSIC Symposium:



Comments regarding the web site or any publicity materials should be directed to the Publicity Chair, Dan Scherrer. Links to our corporate benefactors appear on our symposium website.

GENERAL INFORMATION

IEEE 29th CSIC Symposium Oct 14th - Oct 17th, 2007 Hilton Portland & Executive Tower Portland, Oregon

REGISTRATION

	Advance (Received by Sept. 20 th)	Regular (After Sept. 20 th or on site)
Symposium Registration		
IEEE Member	\$500	\$550
Non-IEEE	\$550	\$620
Student	\$220	\$270
Special 1-day Registration (includes sessions, CD, and digest but no social)		
IEEE Member	\$270	\$320
Non-IEEE	\$320	\$370
Short Course		
Student Registration	\$220	\$320
Primer Course		
Student Registration	\$175	\$175
	\$75	\$75
Technical Digest Only		
	\$85	\$85
Short Course Notes Only		
	\$110	\$110
Digest CD ROM Only		
	\$110	\$110
Primer Course Notes Only		
	\$55	\$55
Extra Reception Ticket		
	\$30	\$30
Extra Theme Party Ticket		
	\$75	\$75

The full Symposium registration fee includes: attendance at all technical sessions and panels; one copy of the Technical Digest and CDROM; continental breakfasts; and morning and afternoon coffee breaks. Also included is admittance to: the Sunday Opening Reception; the Technology Exhibition Opening Reception on Monday and exhibition lunch on Tuesday; all exhibits; and the exciting Tuesday evening Theme Party. The special 1-day registration fee includes the CD and digest, however, does not include the social activities. Additional copies of the Technical Digest and of the Short Course Notes will be available for purchase at the Symposium.

For **ADVANCE REGISTRATION** click on Symposium Registration link on the Symposium website register either through the website or complete the enclosed Advance Registration Form with your remittance of the appropriate fee (check or credit card) **By September 20th, 2007**. Prices will increase after the September 20th deadline.

Mail, Fax, or Email Completed Advance Registration Form to:
IEEE CSICS Registrar, c/o Conference Management Services
445 Hoes Lane, Piscataway, NJ, 08854 USA
Tel: +1-732-465-6620
FAX : +1-732-465-6447
Email: csics07reg@ieee.org

The remittance is payable by checks in U.S. dollars only, by personal/company check drawn on a U.S. bank, U.S. currency traveler's checks, or international money order. Checks must be made payable to "IEEE/2007 CSICS" and must be encoded with the bank number, account number, and check number. Credit cards and wire transfers may also be used. Bank drafts from non-U.S. banks and foreign currency are unacceptable and will be returned.

When you register for the Conference, the contact information you provide (including your name, address, phone, and email address) may be shared with CSICS and vendor exhibitors.

We urge you to pre-register to reduce your costs and to simplify your check-in at the Symposium. Your Technical Digest and registration materials will be ready for you at the Advance Registration Desk.

Registration Center:

The Symposium Registration Center is located in the Hilton Grand Ballroom Foyer on Saturday through Wednesday. The operating hours will be as follows:

Short & Primer Course Registration only

Saturday, October 13th 6:00 p.m. – 8:00 p.m.
Sunday, October 14th 7:00 a.m. – 8:00 a.m.
Sunday, October 14th 3:00 p.m. – 4:00 p.m. (Primer)

Symposium Registration

Sunday, October 14th 3:00 p.m. – 8:00 p.m.
Monday, October 15th 7:00 a.m. – 5:00 p.m.
Tuesday, October 16th 7:00 a.m. – 5:00 p.m.
Wednesday, October 17th 7:00 a.m. – 12:00 noon

Refund Policy:

Please note that after September 20th, 2007, your Advance Registration fee, Short Course fee, Primer Course fee, and fees for additional Symposium Technical Digest, or Reception/Party ticket fees are not refundable. Full refunds, less \$50 handling fee, will be granted for cancellations received in writing by September 20th, 2007. The letter to the Symposium Registrar requesting the refund should state the pre-registrant's name and to whom the refund check should be made payable. Refunds will be made according to the method of payment for the registration, i.e. credit card payments will be refunded to the same credit card, check payments will be refunded by check, etc. All refunds will be processed after the Symposium. **NO PRE-REGISTRATION REFUNDS WILL BE GRANTED AFTER September 20th, 2007.**

ACCOMMODATIONS

Hotel Reservations:

A block of rooms has been reserved at a special discounted group rate for Symposium participants at our headquarters hotel, the Hilton Portland & Executive Tower, 921 SW Sixth Avenue, Portland, OR 97204.

Rate: \$148 Single / Double plus 12.5% tax
Cancellation Policy: 72 hours prior to arrival
Reservation Cut-Off: September 20, 2007
Rating: AAA Four Diamond

The Hilton Portland & Executive Tower hotel is located in the heart of Portland's city center financial and entertainment districts. Newly-renovated standard guestrooms offer large dormer windows, two-line telephones with personalized voicemail, high-speed internet access (fee), working desk, coffee/tea maker, iron/board, hairdryer, Lodgenet movies and video games. Bathrooms incorporate an elegant, new design with granite countertops, mahogany trim and brushed-steel bath accessories. All guestrooms also feature the Hilton Serenity Collection with luxury Suite Dream beds and linens, upgraded bath products from Crabtree and Evelyn, and easy-read clock radios with mini-plugs for MP3 players. Guests will enjoy views of the city, mountains, or river.

The main building's lobby features a dramatic winding staircase, accents finished in mahogany and original Northwest art. Portland, Oregon Hilton hotel guests can enjoy classic American fare in the Bistro 921 & Bar. Other amenities include a full-service business center, concierge desk and the full-service Hilton Athletic Club. The 12,000 sq. ft. Hilton Athletic Club offers an indoor pool and Jacuzzi, extensive cardiovascular equipment, free weights, sauna and steam room, tanning, personal fitness training, and massage services.

Executive Tower features the Porto Terra Tuscan Grill & Bar, a 24-hour fitness center with an indoor wave-less lap pool, and a 24-hour self-serve business center.

Parking: \$18, Valet: \$25

To make Hotel Reservations on-line, click on the "Hotel" link on the Symposium website or go directly to http://www.hilton.com/en/hi/groups/personalized/pdxphhh_iee/index.html. You can also call the Hilton Portland & Executive Tower directly at +1-503-226-1611 or at 1-800-HILTONS. Please identify yourself as part of the IEEE CSIC Symposium using the group code IEE in order to receive the special group rate. The special rate is valid until Thursday, September 20, 2007, reservations received after this date are subject to space and availability.

TRANSPORTATION

Driving direction to the Hilton Portland & Executive Tower from the Portland International Airport (PDX):

Follow City Center signs to I-205 South; then to I-84 West. Follow City Center sign to the Morrison Bridge. Cross bridge, which puts you onto Washington Street. Go straight up Washington Street 6 blocks, to Broadway. Turn left on Broadway, go 5 blocks. Hotel will be on the left - this is the back of the Hotel. Turn left on Salmon Street, and left again on 6th Avenue. The main entrance of the Hotel will be on the left.

Other ground transportation from the Portland International Airport (PDX):

Taxi service is available at the airport. The rate for transfer from the Portland International Airport to the Hilton Portland and Executive Tower is approximately \$33 plus gratuity.

The Blue Star Airport Shuttle operates between 4:00 a.m. and 10:00 p.m. The shuttle picks up and drops off near the front of the hotel. The fare is \$14 per person each way. The Max Light Rail operates service to and from the airport and downtown. The cost is \$2 and the trip lasts approximately 38 minutes.

ADDITIONAL INFORMATION

Message Desk:

A Symposium Message Desk will be in operation in the Registration area during registration hours from Sunday, October 14th at 5 p.m. to Wednesday, October 17th at noon. Please advise callers who wish to reach you during the day to ask the hotel operator for the IEEE CSIC Symposium message desk. The Hilton Portland & Executive Towers main telephone number is +1-503-226-1611. The main desk will transfer you to the registration desk. Please check the message board periodically during the Symposium

Distribution of Relevant Information:

The CSIC Symposium will provide an officially designated area near the registration desk to serve as the proper display area for those in need of space to disseminate free material relevant to the CSIC industry. Printed material of any form will not be allowed to be indiscriminately proliferated in the registration area, hallways, lobbies, or other gathering areas, in proximity to the Symposium, technical sessions, evening social activities, panel sessions, or the exhibition.

Meeting Room Locations:

No Photographic and/or Recording Equipment:

No photographic or recording equipment will be permitted at any time during the technical sessions of the IEEE CSIC Symposium.

Breakfasts:

On Sunday, October 14th, a continental breakfast will be available for Short Course registrants only in Parlors B/C. On Monday and Wednesday, the complimentary breakfast for all Symposium attendees will be held in Galleria North and Galleria South. On Tuesday, there will be a complimentary continental breakfast for all Symposium attendees to be held in the Grand Ballroom I/II, in the exhibition area.

Coffee Breaks:

The locations of coffee breaks will be as follows:

Short Course Registrants (only) –
Sunday, October 14th: Grand Ballroom Foyer

ROCS Registrants (only) –
Sunday, October 14th: TBD

Primer Course Registrants (only) –
Sunday, October 14th: Grand Ballroom Foyer

Symposium Registrants –
Monday, October 15th: Grand Ballroom Foyer
Tuesday, October 16th: Grand Ballroom I/II
Wednesday, October 17th: Grand Ballroom Foyer

Symposium Social Events:

SYMPOSIUM OPENING RECEPTION

We welcome you to Portland on Sunday evening, October 14th from 6:00 p.m. to 8:00 p.m. in the Grand Ballroom II. Come and meet up with your old friends and make new acquaintances over light hors d'oeuvres and wine, beer, or soft drinks. One free admission is included with your registration including two drink tickets, and extra tickets may be purchased at registration for \$30.

EXHIBITION OPENING RECEPTION

Our exhibitors are hosting a reception to mark the exhibition opening on Monday, October 15th from 5:00 p.m. to 7:00 p.m. Every Symposium participant is invited to enjoy the hors d'oeuvres and schmooze and cruise the exhibits in the Grand Ballroom I/II.

EXHIBITION LUNCH

On Tuesday, October 16th, from 11:00 a.m. to 1:00 p.m., the Exhibition Luncheon will be hosted in the Grand Ballroom I/II. The lunch is free to all Symposium participants, so come along, visit with the exhibitors, ask questions, make deals and find out what is going on in our industry.

SYMPOSIUM PARTY

Join us for the Symposium Theme Party on Tuesday, October 16th, from 5:00pm to 10:00pm at McMenamins Crystal Ballroom. Over the course of its 90 year existence, the Crystal Ballroom has played host to world-renowned performers including Rudolph Valentino, Tina Turner, the Grateful Dead, Country Joe & the Fish, Buffalo Springfield, James Brown, and now the Compound Semiconductor IC Symposium! The Crystal Ballroom is an awe-inspiring venue with its vaulted ceilings, grand chandeliers, giant wallscapes, famous "floating" dance floor, floor-to-ceiling windows, and swooping balcony.

The evening will be kicked off with the serving of Hors d'Oeuvres, a wine tasting provided by McMenamins Edgefield Winery and a beer sampling from McMenamins on-site brewery. This will be followed by the main course and desert. We will then enjoy a relaxing evening of music provided by Mobile Music Entertainment and a Casino Night with Roulette, Black Jack, Craps and Poker played with CSIC dollars.

The Crystal Ballroom is located a short 10 minute walk from the conference headquarters at the Portland Hilton & Executive Tower. So we will all have an opportunity to see a little more of the city and also stretch our legs a bit.

This will also provide great flexibility of schedule in the unlikely event that anyone wants to leave early.

The historic setting of the Crystal Ballroom, the food, the locally produced beverages and an evening of music and gaming should provide a great chance to both meet with old friends and to make new ones. One free admission is included with each Symposium registration. Extra tickets can be purchased at the registration center for only \$75.

PORTLAND ATTRACTIONS

The Hilton Portland & Executive Tower hotel is located in the heart of Portland's city center financial and entertainment districts. The Hilton's central location is within blocks of downtown Portland's best restaurants such as Jake's Famous Crawfish and Higgins Restaurant and Bar. Upscale shopping is nearby at Nordstrom, Saks Fifth Avenue and Nike Town. Area attractions include the Portland Art Museum, Rose Garden Arena, Oregon Zoo, OMSI, Oregon Convention Center and Portland State University. These attractions are available by walking or by the MAX Light Rail system. The Portland International Airport is also accessible via the MAX Light Rail which is located just one short block from the hotel.

PORTLAND WEATHER

The daily average maximum temperature for October and November are 63°F and 51°F, respectively, with daily average minimums of 48°F and 42°F, respectively. Average rainfall is 3.39 inches for October and 6.39 inches for November.

SYMPOSIUM HIGHLIGHTS

Technical Program:

The technical program for the 2007 IEEE CSIC Symposium consists of 51 technical papers, four panel sessions, an Industry Exhibit, and 2 Short Courses, "Millimeter Wave Imaging: Devices, Circuits and Systems" and "Power Amplifier Technologies and Circuit Techniques." We will also be offering our annual introductory level class "Basics of Compound Semiconductor ICs" (Primer Course). This year we have invited 15 papers on a wide range of important topics encompassing device engineering to circuit application using advanced compound and other related semiconductor technologies. In addition, we will continue the tradition of including important "late breaking news" papers.

Exciting new developments from a variety of compound semiconductor disciplines will be presented. There is a tremendous amount of activity in the wireless and optical communication areas, as well as a strong interest in military electronics.

Short Course 1: "Millimeter Wave Imaging: Devices, Circuits and Systems"

Short Course Description

Millimeter wave imaging for security and all-weather vision has become a hot topic recently. Key components of imaging systems are based on various compound semiconductor technologies. In this course, four experts in mm-wave imaging will discuss the components, the architectures and the various applications of imaging systems from 90 GHz to THz.

Topics Covered and Instructors:

- 1) mm-Wave Applications and Architectures – Chris Martin, Trex
- 2) Detectors for mm-Wave Imaging – Joel Schulman, HRL
- 3) MMIC Design for mm-Wave Imaging – Harris Moyer, HRL
- 4) Security Imaging from mm-Wave to THz – Erich Grossman, NIST

Short Course 2: "Power Amplifier Technologies and Circuit Techniques"

Short Course Description

Power Amplifiers continue to be the bread and butter of the compound semiconductor industry. GHz PAs were previously dominated by GaAs because of superior efficiency. Today, advanced circuit techniques and technological breakthroughs allow many material systems to compete for a myriad of PA applications. This course will review some of the newer developments in technologies and circuit techniques as applied to power amplifiers.

Topics Covered and Instructors:

- 1) GaN Technology for Power Amplifiers – Stephen I. Long, UCSB
- 2) Large signal characterization and modeling – Larry Dunleavy, Modelithics Inc.
- 3) Design Techniques for Efficiency Enhancement.- Peter Asbeck, UCSD
- 4) Silicon PA technology - Julio Costa, RFMD

Registration for the course is as noted in "Registration". A limited number of Short Course Notes will be available after the course for purchase by Symposium registrants, subject to availability.

Direct questions to:

Marko Sokolich, Short Course Coordinator
HRL Laboratories
1-(310)-317-5148
msokolich@hrl.com

Primer Course: Basics of Compound Semiconductor ICs

The popular primer course "Basics of Compound Semiconductor ICs" is an introductory-level class intended for professionals in the electronic industry with little or no experience in compound semiconductor IC technology. It also provides an excellent review for those with more experience. The course covers: digital and analog/RF/microwave circuits; III/V materials including wide bandgap GaN and SiC; MOS and bipolar devices. The course is tailored to provide background for symposium participants to better understand and appreciate the papers presented, including a glossary of those ever-cryptic acronyms. Throughout the course, comparisons among the compound semiconductor technologies will be presented as well as comparisons with silicon technologies. Also, a number of compound semiconductor integrated circuits along with the intended applications will be described.

Instructors Stephen I. Long and Donald B. Estreich each have over 25 years of experience working with compound semiconductor ICs. A copy of their viewgraphs with an extensive bibliography will be distributed to each Primer Course registrant. Ample discussion time will provide an opportunity for participants to have questions answered by the instructors.

Course Agenda:

4:00 p.m. Introduction
4:05 p.m. Compound Semiconductor Materials
4:30 p.m. Device Operation
5:00 p.m. Discussion
5:10 p.m. Break
5:20 p.m. Analog/RF/Microwave Circuits
6:00 p.m. RFIC Design Examples
6:40 p.m. Summary and Discussion
7:00 p.m. Close

The registration fee is \$175 for professionals and \$75 for students. The fee includes a handout containing a copy of the overheads with an extensive reference list. Space is limited, so ADVANCE REGISTRATION IS HIGHLY RECOMMENDED. For additional information, please contact the Primer Course Coordinator:

Direct questions to:

Walter Wohlmuth, Primer Course Organizer and Chair
RFMD
7628 Thorndike Rd.
Greensboro, NC 27409 USA
1-(336)-678-5808

Registration for the class is as noted in "Registration". A limited number of copies of the handouts will be available to symposium registrants, subject to availability. The cost is \$50.

Panel Sessions:

This year we have four exciting Panel Sessions spread over the 3 days of the technical sessions. These are intended to be timely, thought-provoking, educational, and possibly even controversial. **The 4 panel topics are as follows:**

Panel Session 1:

“100GbE: market drivers, architectures, technical and economic challenges”

Monday, October 15th, 3:30-5:00 p.m.

Panel Session 2:

“High Efficiency Linear PA Techniques for Basestations”

Tuesday, October 16th, 3:00-4:30 p.m.

Panel Session 3:

“Potential of future applications of mm-wave CMOS: Feasibility of 60GHz WPAN/WLAN in CMOS?”

Wednesday, October 17th, 1:00-2:30 p.m.

Panel Session 4:

“Which switch gets ditched?”

Wednesday, October 17th, 3:00-4:30 p.m.

Please see the "Symposium Program" section later in this brochure for more complete descriptions of each of these Panel Sessions (listed according to their day and time).

Technology Exhibition:

The 2007 Technology Exhibition will be held concurrently with the IEEE CSIC Symposium on October 15 and 16 in the Grand Ballroom I/II of the Hilton Portland & Executive Tower. The Exhibition is open to all Symposium registrants. The combined exhibition gives companies and attendees access to the entire array of compound semiconductor products and services, i.e., materials, manufacturing, device technology, integrated circuits, related services, commercial and military applications. The early list of exhibitors includes:

Accel-RF Corporation
ACROTEC/Nikko Materials USA, Inc.
AWR - Applied Wave Research
AXT, Inc.
Bandwidth Semiconductor
BOC Edwards
EpiWorks
Insaco, Inc.
IntelliEPI
KLA-Tencor
Kopin Corporation
Momentive Performance Materials (formerly GE Advanced Materials)
Osemi, Inc.
Picogiga International
Riber
Sonnet Software
Sumika Electronic Materials, Inc.
Synopsys, Inc.
Toyo Tanso USA, Inc.
Veeco Instruments

The Exhibition will feature informative and interesting displays with corporate representatives on hand between the hours of 5:00 p.m. and 8:00 p.m. on Monday, October 15 and 7:00 a.m. to 4:00 p.m. on Tuesday, October 16.

The Exhibition will also host the Exhibition Opening Reception on Monday evening from 5:00 p.m. until 8:00 p.m. and the Exhibition Luncheon from 11:00 a.m. until 1:00 p.m. on Tuesday. All Symposium coffee breaks on Tuesday will be held in the exhibition area.

There is still time for additional organizations to participate in the Exhibition. Interested parties should contact Sue Kingston, 1514 First Street, Manhattan Beach, CA 90266, Ph: +1-310-937-1006, Fax: +1-732-465-6447, Email:s.kingston@ieee.org. For more information, please visit the Symposium website at <http://www.csics.org/> and click on the Exhibition Information link.

Late-Breaking News Papers:

We have solicited papers containing late-breaking news for the Symposium Program. These will be presented on Wednesday, October 17th, from 3:00 p.m. to 4:40 p.m. in Grand Ballroom II. Topics include:

S.1

“Robust Broadband (4 GHz - 16 GHz°

GaN MMIC LNA”

S.2

“Demonstration of a 3-D HEMT Phase Shifter MMIC Utilizing a Five Layer BCB Process with Seven Metal Layers”

S.3

“A Fully On-Chip, Single-Ended S-band Image Reject Mixer for High Dynamic Range Applications”

S.4

“Metamorphic HEMT Amplifier Circuits for Use in a High Resolution 210 GHz Radar”

S.5

“A 77-79-GHz Doppler Radar Transceiver in Silicon”

Technical Digest:

Extra copies of the Technical Digest can be purchased by Symposium registrants through Advance Registration. A limited number of digests will also be available for sale at the Registration Desk after 1:00 p.m. on Tuesday, October 16th. The cost of the paper bound digest, if ordered through Advance Registration or purchased on-site, is \$75. The CD ROM Digest for 2007 will also be offered for \$100. Both current and past digests will be available through IEEE after the Symposium by mail from the IEEE Customer Service Center, 445 Hoes Lane, Piscataway, NJ 08854 at (800) 701-4333.

Outstanding Paper Award:

The 2007 IEEE CSIC Symposium will select a contributed paper for the Outstanding Paper Award. All contributed regular papers (not the invited papers) will automatically be considered as candidates. Symposium attendees will have an opportunity to provide feedback through a Symposium questionnaire as well as to the Session Chairpersons. The award winner will be publicly announced shortly after this year's Symposium with the award formally presented at next year's Compound Semiconductor IC Symposium.

SHORT COURSES

Sunday, October 14th, 2007
Hilton Portland & Executive Tower
Gallerias
8:30a.m. - 3:45p.m.

Course Coordinator: Marko Sokolich
HRL Laboratories
310-317-5148
msokolich@hrl.com

This year the CSIC Symposium will hold two short courses. One course covers millimeter wave imaging and the other course covers advances in PA technology and circuit techniques.

“Millimeter Wave Imaging: Devices, Circuits and Systems”

Millimeter wave imaging for security and all-weather vision has become a hot topic recently. Key components of imaging systems are based on various compound semiconductor technologies. In this course, four experts in mm-wave imaging will discuss the components, the architectures and the various applications of imaging systems from 90 GHz to THz.

Topics Covered and Instructors:

- 1) mm-Wave Applications and Architectures – Chris Martin, Trex
- 2) Detectors for mm-Wave Imaging – Joel Schulman, HRL
- 3) MMIC Design for mm-Wave Imaging – Harris Moyer, HRL
- 4) Security Imaging from mm-Wave to THz – Erich Grossman, NIST

Short Course Schedule

The course will be held on Sunday October 14th and will begin with a continental breakfast. A lunch will be provided as well as a morning refreshment break.

7:00 a.m. **Registration and Breakfast**

8:30 a.m. **Introduction and Overview**

8:45 a.m. **mm-Wave Applications and Architectures**
Chris Martin, Trex

10:15 a.m. **Coffee Break**

10:30 a.m. **Detectors for mm-Wave Imaging**
Joel Schulman, HRL Laboratories, LLC

12:00 p.m. **Lunch**

1:30 p.m. **MMIC Design for mm-Wave Imaging**
Harris Moyer, HRL Laboratories, LLC

3:00 p.m. **Security Imaging from mm-Wave to THz**
Erich Grossman, NIST

4:30 p.m. **Questions and Discussion**

4:45 p.m. **Close of Short Course**

“Power Amplifier Technologies and Circuit Techniques”

Power Amplifiers continue to be the bread and butter of the compound semiconductor industry. GHz PAs were previously dominated by GaAs because of superior efficiency. Today, advanced circuit techniques and technological breakthroughs allow many material systems to compete for a myriad of PA applications. This course will review some of the newer developments in technologies and circuit techniques as applied to power amplifiers.

Topics Covered and Instructors:

- 1) GaN Technology for Power Amplifiers – Stephen I. Long, UCSB
- 2) Large signal characterization and modeling – Larry Dunleavy, Modelithics Inc.
- 3) Design Techniques for Efficiency Enhancement.- Peter Asbeck, UCSD
- 4) Silicon PA technology - Julio Costa, RFMD

Short Course Schedule

The course will be held on Sunday October 14th and will begin with a continental breakfast. A lunch will be provided as well as a morning refreshment break.

7:00 a.m. **Registration and Breakfast**

8:30 a.m. **Introduction and Overview**

8:45 a.m. **GaN Technology for Power Amplifiers**
Stephen I. Long, UCSB

10:15 a.m. **Coffee Break**

10:30 a.m. **Large Signal Characterization and Modeling Enhancement**
Larry Dunleavy, Modelithics Inc.

12:00 p.m. **Lunch**

1:30 p.m. **Design Techniques for Efficiency Enhancement**
Peter Asbeck, UCSD

3:00 p.m. **Silicon Power Amplifier Technology**
Julio Costa, RFMD

4:30 p.m. **Questions and Discussion**

4:45 p.m. **Close of Short Course**

Who Should Attend

The short courses are a must for everyone interested in knowing the latest in advanced design technologies and their applications to both defense and commercial markets. Our lecturers will cater to a range of interests and experience levels. The course is designed to give all attendees a solid overview of the device technology from device physics fundamentals through specific circuit examples and applications.

Short Course Pre-Registration

So that we may properly plan for attendance, we encourage you to pre-register for the Short Courses. A limited number of registrations will be available on-site immediately prior to the start of the course. The price for the Short Course is \$350 for those that pre-register, and \$450 for those that register on-site. The price for students is \$200 for those that pre-register, and \$300 for on-site registration. The registration fee includes the lectures, a book of Short Course Notes, continental breakfast, lunch, and morning/afternoon refreshments. Additional copies of the Short Course Notes may be purchased for \$100 each.

PRIMER COURSE

Sunday, October 14th, 2007
Hilton Portland & Executive Tower
Galleria North
4:00 p.m. - 7:00 p.m.

“Basics of Compound Semiconductor ICs”

Instructors: **Stephen I. Long**
University of California, Santa Barbara, CA
Donald B. Estreich
Agilent Technologies, Santa Rosa, CA

Course Coordinator: **Walter Wohlmuth**
RFMD

Course Objective and Description:

The popular primer course "Basics of Compound Semiconductor ICs" is an introductory-level class intended for professionals in the electronic industry with little or no experience in compound semiconductor IC technology. It also provides an excellent review for those with more experience. The course covers: digital and analog/RF/microwave circuits; III/V materials including wide bandgap GaN and SiC; MOS and bipolar devices. The course is tailored to provide background for symposium participants to better understand and appreciate the papers presented, including a glossary of those ever-cryptic acronyms. Throughout the course, comparisons among the compound semiconductor technologies will be presented as well as comparisons with silicon technologies. Also, a number of compound semiconductor integrated circuits along with the intended applications will be described.

Instructors Stephen I. Long and Donald B. Estreich each have over 25 years of experience working with compound semiconductor ICs. A copy of their viewgraphs with an extensive bibliography will be distributed to each Primer Course registrant. Ample discussion time will provide an opportunity for participants to have questions answered by the instructors.

Course Agenda:

4:00 p.m. Introduction
4:05 p.m. Compound Semiconductor Materials
4:30 p.m. Device Operation
5:00 p.m. Discussion
5:10 p.m. Break
5:20 p.m. Analog/RF/Microwave Circuits
6:00 p.m. RFIC Design Examples
6:40 p.m. Summary and Discussion
7:00 p.m. Close

The registration fee is \$175 for professionals and \$75 for students. The fee includes a handout containing a copy of the overheads with an extensive reference list. Space is limited, so **ADVANCE REGISTRATION IS HIGHLY RECOMMENDED**. For additional information, please contact the Primer Course Coordinator:

Direct questions to:

Walter A. Wohlmuth, Primer Course Organizer and Chair
RF MicroDevices
7914 Piedmont Triad Pkwy., Greensboro, NC 27409, USA
(336)-678-5808

Registration for the class is as noted in "Registration". A limited number of copies of the handouts will be available to symposium registrants, subject to availability. The cost is \$50.

OTHER MEETINGS

ROCS Workshop

(formerly GaAs Reliability Workshop)

TBD, Hilton Portland & Executive Tower

8:00 a.m. - 5:00 p.m.

The 22nd annual ROCS Workshop - formerly known as the GaAs Reliability Workshop - will be held in conjunction with CSIC Symposium on Sunday October 14th, 2007, at the Hilton Portland and Executive Tower, Portland, Oregon. This meeting is sponsored by the JEDEC JC-14.7 Committee on GaAs Reliability and Quality Standards and the EIA, and with co-sponsorship of the Electron Devices Society of the IEEE.

The ROCS Workshop brings together researchers, manufacturers and users of compound semiconductor materials, devices and circuits. Papers presenting latest results, including work-in-progress and new developments in all aspects of compound semiconductor reliability will be presented. Potential authors are invited to submit an electronic copy of a one to two page comprehensive summary, suitable for a 15 minute presentation, to: Peter Ersland, erslandp@tycoelectronics.com (978)-656-2817. The deadline for receipt of submissions is August 6th, 2007; late papers of significant interest will be considered up to the Workshop. The Advanced Program will be published at <http://www.jedec.org/home/gaas/> approximately one month prior to the meeting.

Advance registration for the workshop is \$150.00 for JEDEC and IEEE members and \$175.00 for non-members; on-site registration is \$200.00 at the door. To pre-register, mail your name, Post Office address, email address, and phone number with a check to: EIA/JEDEC, ROCS Workshop, 2500 Wilson Boulevard, Arlington, VA 22201-3834 by October 1st, 2007. Visa, MasterCard and American Express credit cards are also accepted. Registration includes a full day of ROCS presentations, two breaks, a luncheon and a copy of the Proceedings. Late registration will be available from 7:30 a.m. to 8:00 a.m. on the morning of the workshop. For further information or to download a pre-registration form, visit our WEB site at <http://www.jedec.org/home/gaas/>, or contact: Dr. Anthony A. Immorlica, Jr., Workshop Chair
BAE SYSTEMS, P.O. Box 868, MER15-1351, Nashua, NH 03061-0868
(603) 885-1100
anthony.a.immorlica@baesystems.com.

SYMPOSIUM PROGRAM

Monday, October 15th, 2007

REGISTRATION AND CONTINENTAL BREAKFAST

7:00 a.m. – 5:00 p.m.

Registration – Grand Ballroom Foyer

7:00 a.m. – 8:00 a.m.

Continental Breakfast – Galleries

SYMPOSIUM OPENING

8:00 a.m. – 8:30 a.m.

Grand Ballroom II – Hilton Portland and Executive Tower

Opening Remarks

2007 Symposium Chair

Mohammad Madhian, *NEC Corporation of America*

Technical Program Overview

2007 Technical Program Chair

Bill Peatman, *Anadigics Inc.*

SESSION A: PLENARY SESSION

8:30 a.m. – 11:00 a.m.

Grand Ballroom II – Hilton Portland & Executive Tower

Chairpersons: Marko Sokolich *HRL Laboratories*
Dave Halchin *RFMD*

8:30 a.m.

A.1 **The Future of Compound Semiconductors (Invited)**

Ralph Gilbert Quinsey, *Triquint Semiconductor, Hillsboro, Oregon 97035.*

9:00 a.m.

A.2 **Frontiers of Compound Semiconductor Electronics (Invited)**

John C. Zolper, *Microsystems Technology Office (MTO), Defense Advanced Research Projects Agency (DARPA), Arlington, Virginia 22213*

9:30 a.m.

A.3 **100-200 GHz CMOS Signal Sources and Detectors (Invited)**

Kenneth K. O, *Department of Electrical Engineering, University of Florida, Gainesville, Florida, 32611.*

10:00 a.m. - 10:20 a.m.

Coffee Break

10:20 a.m.

A.4 **GaN Power Devices for Automotive Applications (Invited)**

Tetsu Kachi, *Compound Semiconductor Lab., Toyota Central R&D Labs, Inc., Nagakute-cho, Aichi, Japan, 480-1192.*

10:50 a.m.

A.5 **The Future of Ethernet (Invited)**

Bradley J. Booth, *CTO Office, AMCC, Hillsboro, Oregon, 97124*

11:20 a.m.

End of Session A

11:20 p.m. – 1:00 p.m. **Break for Lunch**

Monday, October 15th, 2007

SESSION B: GaN Devices

1:00 p.m. – 2:50 p.m.

Galleria North – Hilton Portland & Executive Tower

Chairpersons: Rik Jos, *NXP Semiconductors*
Primit Parikh, *Transphorm Inc.*

1:00 p.m.

B.1 **Multilayer W-band Transmit Elements for Scalable Millimeter-wave Arrays**

R. S. Tsai, D. Duan, K. Tornquist, S. Shih, J. Padilla, *Northrop Grumman Space Technology, Redondo Beach, United States*

1:20 p.m.

B.2 **Novel Package Technology of Ultra High Power Light-Emitting Diodes by Electroplating**

Y.K. Su^{1,2}, K.C. Chen^{1,2}, C. L. Lin³, R. W. Chuang^{1,2}, J.Q. Huang^{1,2}, H.S. Hsu^{1,2}, ¹*Institute of Microelectronics, National Cheng Kung University*, ²*Advanced Optoelectronic Technology Center, National Cheng Kung University*, ³*Dept. of Electronic Engineering, Kun-Shan University, Taiwan*

1:40 p.m.

B.3 **High Fmax GaN-HEMT with High Breakdown Voltage for Millimeter Wave Applications (Invited)**

T. Kikkawa¹, K. Makiyama¹, K. Imanishi¹, T. Ohki¹, M. Kanamura¹, N. Okamoto¹, N. Hara², K. Joshin¹, ¹*Fujitsu Ltd., Atsugi, Japan*, ²*Fujitsu Laboratories Ltd., Atsugi, Japan*

2:10 p.m.

B.4 **High-Power, High-Voltage AlGaIn/GaN HEMTs-on-Si**

C. Park, A. Edwards, P. Rajagopal, W. Johnson, S. Singhal, I. Kizilyalli, E. L. Piner, K. J. Linthicum, *Nitronex Corporation, Durham, United States*

2:30 p.m.

B.5 **CW 20-W AlGaIn/GaN FET Power Amplifier for Quasi-Millimeter Wave Applications**

Y. Murase, A. Wakejima, T. Inoue, K. Yamanoguchi, M. Tanomura, T. Nakayama, Y. Okamoto, K. Ota, Y. Ando, N. Kuroda, K. Matsunaga, H. Miyamoto, *R&D Association for Future Electron Devices, Otsu, Japan*

2:50 p.m.

End of Session B

2:50 p.m. – 3:30 p.m.

Coffee Break

Monday, October 15th, 2007

PANEL SESSION 1:

100 GbE: market drivers, architectures, technical and economic challenges

3:30 p.m. – 5:00 p.m.

Galleria South – Hilton Portland & Executive Tower

Moderators: Koichi Murata, *NTT Photonics Laboratories*
Tod Dickson, *IBM*

Optical communication links operating at 100 Gbit/s are no longer just the purview of the research community. For over a year now, the IEEE 802.3 Higher Speed Study Group (HSSG) has been exploring the need for and possible implementation of “real” 100 GbE fiber optic links. 100 GbE promises to be an important technology driver with widespread benefits for both the consumer and the high-speed optoelectronic IC industry. This panel will discuss market drivers, architectures, and the enormous technical and economic challenges that 100 GbE represents. In addition to clarifying the technical requirements of an economical 100 GbE transceiver, the session will be used to weigh up and compare the various proposed solutions. By better understanding what is technically and economically feasible, and what options exist, it is hoped that this panel will provide useful insight for IC and optoelectronic IC developers.

Panel Members:

Christopher Cole	<i>Finisar</i>
Petre Popescu	<i>Astar</i>
Yoshiyasu Doi	<i>Fujitsu</i>
Yves Baeyens	<i>Alcatel-Lucent</i>
Rainer Derksen	<i>Nokia Siemens Networks</i>

5:00 p.m.

End of Panel Session 1

SESSION D: High-Power Amplifier Technology

3:30 p.m. – 4:50 p.m.

Galleria North – Hilton Portland & Executive Tower

Chairpersons: Robb Shimon, *Agilent Technologies*
Chuck Campbell, *TriQuint Semiconductor*

3:30 p.m.

D.1 Recent Advances in GaN-on-SiC HEMT Reliability and Microwave Performance within the DARPA WBGs-RF Program

M. J. Rosker, Defense Advanced Research Projects Agency, 3701 N. Fairfax Dr., Arlington, VA 22203, USA.

3:50 p.m.

D.2 A 250W S-Band GaN HEMT Amplifier

K. Krishnamurthy, M. J. Poulton, J. Martin, R. Vetry, J. D. Brown, and J. B. Shealy, RF Micro Devices, Infrastructure Product Line, Charlotte, NC 28269, USA.

4:10 p.m.

D.3 A 40W GaN HEMT Doherty Power Amplifier with 48% Efficiency for WiMAX Applications

H. Sano, N. Ui, and S. Sano, Eudyna Devices, Inc., 1 Kanai-cho, Sakae-ku, Yokohama, Kanagawa, 244-0845, Japan.

Monday, October 15th, 2007

4:30 p.m.

D.4 250W HVHBT Doherty with 57% WCDMA Efficiency Linearized to -55dBc for 2c11 6.5dB PAR

C. Steinbeiser, T. Landon, and C. Suckling, TriQuint Semiconductor, 500 W. Renner Rd., Richardson, TX 75080, USA.

4:50 p.m.

End of Session D

**Technology Exhibition Opening
Reception
Grand Ballroom I/II
5:30 p.m. - 8:00 p.m.**

REGISTRATION AND CONTINENTAL BREAKFAST

7:00 a.m. – 5:00 p.m.

Registration – Grand Ballroom Foyer

7:00 a.m. – 8:00 a.m.

Continental Breakfast – Grand Ballroom I/II

SESSION F: Building Blocks for mm-Wave and Beyond

8:00 a.m. – 9:20 a.m.

Galleria North – Hilton Portland & Executive Tower

Chairpersons: Robb Shimon, *Agilent Technologies*
Dan Scherrer, *Northrop Grumman*

8:00 a.m.

F.1 **Distributed Amplifier MMIC with 21 dB Gain and 90 GHz Bandwidth using InP-based DHBTs**

K. Schneider, R. Driad, R.-E. Makon, G. Weimann, *Fraunhofer Institute for Applied Solid-State Physics (IAF), Tullastrasse 72, D-79108, Freiburg, Germany.*

8:20 a.m.

F.2 **A 210 GHz, Subharmonically-Pumped Active FET Mixer MMIC for Radar Imaging Applications**

I. Kallfass, H. Massler, A. Leuther, *Fraunhofer Institute for Applied Solid-State Physics (IAF), Tullastrasse 72, D-79108 Freiburg, Germany.*

8:40 a.m.

F.3 **Demonstration of a S-MMIC LNA with 16-dB Gain at 340-GHz**

W. R. Deal, X.B. Mei, V. Radisic, W. Yoshida, P.H. Liu, J. Uyeda, M. Barsky, T. Gaier*, A. Fung*, L. Samoska*, R. Lai, *Northrop Grumman Space and Mission Systems, Redondo Beach CA, 90278, USA. *Jet Propulsion Laboratory, Pasadena CA, 91109, USA.*

9:00 a.m.

F.4 **A W-Band 4-Bit Phase Shifter in Multilayer Scalable Array Systems**

S.E. Shih, D.W. Duan, O. Fordham, M. Parmar, K. Tornquist, X. Zeng, P. Chang-Chien, R. Tsai, *Northrop Grumman Space Technology, One Space Park Drive, Redondo Beach, CA 90278, USA.*

9:20 a.m.

End of Session F

9:20 a.m. – 10:00 a.m.

Coffee Break

SESSION G: Emerging 100 Gb/s Communication Technologies

8:00 a.m. – 9:30 a.m.

Galleria South – Hilton Portland & Executive Tower

Chairpersons: Douglas S. McPherson, *ITT AC/D*
Koichi Murata, *NTT Photonics Laboratories*

8:00 a.m.

G.1 **Recent Progress in High-speed and Large-Capacity Optical Transmission Technologies (Invited)**

A. Sano, H. Masuda, E. Yoshida, Y. Miyamoto, *NTT Corporation Network Innovation Laboratories, Yokosuka, Kanagawa 239-0847, Japan.*

8:30 a.m.

G.2 **100-Gbit/s full-ETDM transmission technologies (Invited)**

R. H. Derksen¹, M. Möller², C. Schubert³, ¹*Nokia Siemens Networks GmbH & Co. KG, Research, Technology and Platforms, München, D-81730, Germany.* ²*MICRAM Microelectronic GmbH, Bochum, D-44801, Germany.* ³*Fraunhofer-Institut Nachrichtentechnik, Heinrich-Hertz-Institut, Optical Signal Processing, Berlin, D-10587, Germany.*

9:00 a.m.

G.3 **High-Speed Analog-to-Digital Converters in SiGe Technologies (Invited)**

J. Lee, *Alcatel-Lucent Bell Laboratories, 600 Mountain Avenue, Murray Hill, New Jersey, 07974, USA.*

9:30 a.m.

End of Session G

9:30 a.m. – 10:00 a.m.

Coffee Break

SESSION H: Amplifier Techniques

10:00 a.m. – 11:00 a.m.

Galleria North – Hilton Portland & Executive Tower

Chairpersons: Jan-Erik Mueller, *Infineon Technologies*
Francois Colomb, *Raytheon*

10:00 a.m.

H.1 **GaAs PHEMT Power Amplifier MMIC with Integrated ESD Protection for Full SMD 38-GHz Radio Chipset**

A. Bessemoulin, S.J. Mahon, D. Richardson, *Mimix Broadband Inc., 10795 Rockley Road, Houston, TX 77099, USA.*

10:20 a.m.

H.2 **Statistical Large-Signal Model Enabling Yield Optimization in High-Power Amplifier Design**

Wolfram Stiebler, Patricia Koliass, Jay Sanctuary, *Raytheon RF Components, Andover MA 01810, USA.*

10:40 a.m.

- H.3 **Broadband GaN Dual-Gate HEMT Low Noise Amplifier**
S.E. Shih, W.R. Deal, W.E. Sutton, Y.C. Chen, I. Smorchkova, B. Heying, M. Wojtowicz, M. Siddiqui, *Northrop Grumman Space Technology, One Space Park Drive, Redondo Beach, CA 90278, USA*

11:00 a.m.

End of Session H

SESSION I: mm-Wave and High-Speed CMOS

10:00 a.m. – 11:10 a.m.

Galleria South – Hilton Portland & Executive Tower

Chairpersons: Kazuya Yamamoto, *Mitsubishi Electric Corp.*
Tod Dickson, *IBM*

10:00 a.m.

- I.1 **A Low-power 40 Gbit/s Receiver Circuit Based on Full-Swing CMOS-Style Clocking (Invited)**
Thomas Toifl, Christian Menolfi, Peter Buchmann, Christoph Hagleitner, Marcel Kossel, Thomas Morf, Jonas Weiss and Martin Schmatz, *IBM Research, Zurich Research Laboratory, Switzerland.*

10:30 a.m.

- I.2 **A 1.2V 15.6mW 81GHz 2:1 Static CML Frequency Divider with a Band-Pass Load in a 90nm SOI CMOS Technology**
Jean-Olivier Plouchart¹, Daiek Kim², Jonghae Kim², Victor Karam³, Calvin Plett³, Choongyeun Cho² and Robert Trzcinski¹, ¹*IBM T. J. Watson, Yorktown Heights, 10598 NY*, ²*IBM SRDC, Hopewell Junction, 12533 NY*, ³*Carleton University, Ottawa, Canada.*

10:50 a.m.

- I.3 **A High-Gain, Low-Noise, +6dBm PA in 90nm CMOS for 60-GHz Radio**
M. Khanpour¹, S.P. Voinigescu¹, and M.T. Yang², ¹*ECE Department, University of Toronto, Toronto, ON, M5S 3G4, Canada*, ²*Product Engineering Special Program, TSMC, Hsin-Chu, Taiwan, ROC*

11:10 a.m.

End of Session I

11:00 a.m. – 1:00 p.m.

Break for Lunch

Technical Exhibition Lunch
Grand Ballroom I/II
11:00 a.m. – 1:00 p.m.

SESSION J: Device Modeling and Characterization

1:00 p.m. – 2:30 p.m.

Galleria North – Hilton Portland & Executive Tower

Chairpersons: Toshihide Kikkawa, *Fujitsu*
Mike Golio, *HVVI Semiconductor*

1:00 p.m.

- J.1 **A Classic Nonlinear FET model for GaN HEMT Devices**
F. Kharabi, M. J. Poulton, D. Halchin, D. Green, *RF Micro Devices, Inc., Greensboro, NC 27409, USA.*

1:20 p.m.

- J.2 **Predictive Simulation of AlGaIn/GaN HEMTs**
S. Vitanov¹, V. Palankovski¹, S. Murad², T. Rödler², R. Quay³, and S. Selberherr¹, ¹*Advanced Materials and Device Analysis Group at Inst. for Microelectronics, TU Wien, Gußhausstraße 27–29/E360, 1040 Wien, Austria.* ²*ICRF, NXP Semiconductors, Gerstweg 2, 6534 AE Nijmegen, The Netherlands.* ³*Fraunhofer Inst. for Solid-State Physics (IAF), Tullastraße 72, 79108 Freiburg, Germany.*

1:40 p.m.

- J.3 **Thermal Properties and Reliability of GaN Microelectronics : Sub-Micron Spatial and Nanosecond Time Resolution Thermography (Invited)**
Martin Kuball¹, James W. Pomeroy¹, Richard Simms¹, Gernot J. Riedel¹, Hangfeng Ji¹, Andrei Sarua¹, Michael J. Uren², Trevor Martin², ¹*H.H. Wills Physics Laboratory, University of Bristol, Tyndall Avenue, Bristol BS8 1TL, United Kingdom.* ²*QinetiQ Ltd., St. Andrews Road, Malvern WR14 3PS, United Kingdom.*

2:10 p.m.

- J.4 **Characterization of Silicon Carbide Differential Amplifiers at High Temperature**
Amita C. Patil, Chompoonoot Anupongongarch, Xiao-An Fu, Mehran Mehregany and Steven Garverick, *Electrical Engineering and Computer Science Case Western Reserve University, Cleveland, OH, USA.*

2:30 p.m.

End of Session J

2:30 p.m. – 3:00 p.m.

Coffee Break

PANEL SESSION 2:

High Efficiency Linear PA Techniques for Basestations

3:00 p.m. – 4:30 p.m.

Galleria South – Hilton Portland & Executive Tower

Moderators: Matthew Poulton, *RF Micro Devices*
Robb Shimon, *Agilent Technologies*

Efficiency and linearity are critical circuit specifications for basestations. Next generation modulation standards such as 4G/LTE (Long Term Evolution) and WiMAX continue to demand improved efficiency while maintaining or demanding more stringent linearity requirements. Over the last few years circuit designers have used a range of different techniques, both circuit design based and software based, to improve backed off efficiency levels and maintain linearity. Often combinations of circuit and software solutions are used. Additionally during this timeframe a number of new semiconductors (such as GaN HEMT, high voltage GaAs pHEMT and HBT or SiC MESFETs) have been developed to compete against the dominant technology in the RF power amplifier marketplace today, silicon LDMOS.

Panelists will be asked:

- 1) To address the relative merits and shortcomings of promising circuit topologies: Doherty, EER, switched-mode, drain modulation, and other variants.
- 2) To provide their view on which semiconductor device technologies are delivering solutions to new amplifier topologies today or in the near term future.
- 3) What are the attributes of the “ideal power device” for the power amplifier circuit topologies discussed?

Panel Members:

Bumman Kim	<i>POSTECH</i>
Don Kimball	<i>University of California, San Diego</i>
David Kelly	<i>Pulsewave RF</i>
Dave Runton	<i>RF Micro Devices</i>
Gerrard Wimpenny	<i>Nujira</i>
John Gajadharsing	<i>NXP Semiconductor</i>

4:30 p.m.

End of Panel Session 2

Symposium Theme Party
Tastes of the Northwest
5:00 p.m. - 10:00 p.m.

REGISTRATION AND CONTINENTAL BREAKFAST

7:00 a.m. – 5:00 p.m.

Registration – Grand Ballroom Foyer

7:00 a.m. – 8:00 a.m.

Continental Breakfast – Galleries

SESSION N: TR Modules and Switches

8:00 a.m. – 9:40 a.m.

Grand Ballroom I – Hilton Portland & Executive Tower

Chairpersons: Dan Scherrer, *Northrop Grumman*
Francois Colomb, *Raytheon*

8:00 a.m.

N.1 SiGe T/R Modules for Ka-Band Phased Arrays (Invited)

Byung-Wook Min¹, Michael Chang¹ and Gabriel M. Rebeiz²,
¹*Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI 48109, USA.* ²*Electrical and Computer Engineering, University of California, San Diego, CA 92093, USA.*

8:30 a.m.

N.2 Optimum Matching Technique for the Switch Design

D. Prikhodko, Y. Tkachenko, R. Srinivasan, Y. Zhu, J. Mason, S. Sprinkle, S. Nabokin, *Skyworks Solutions Inc., 20 Sylvan Road, Woburn, USA.*

8:50 a.m.

N.3 A Compact SPDT Switch in 0.18um CMOS Process with High Linearity and Low Insertion Loss

Mary Teshiba, Glenn Sakamoto, Terry Cisco, *Raytheon Company, Solid State Microwave, 2000E. Imperial Hwy., El Segundo, CA 90245, USA.*

9:10 a.m.

N.4 Nanoscale CMOS for mm-Wave Applications (Invited)

Ali M. Niknejad, *Berkeley Wireless Research Center, University of California at Berkeley, Berkeley, CA 94720, USA.*

9:40 a.m.

End of Session N

9:40 a.m. - 10:00 a.m.

Coffee Break

SESSION O: High Speed Mixed Signal Circuits

8:00 a.m. – 9:20 a.m.

Grand Ballroom II – Hilton Portland & Executive Tower

Chairpersons: Matt D'Amore, *Northrop Grumman*
Mounir Meghelli, *IBM TJ Watson Labs*

8:00 a.m.

O.1 InP Single-ended Transimpedance Amplifier with 92-GHz Transimpedance Bandwidth

V. E. Houttsma, N. G. Weimann, A. Tate, J. Frackoviak, Y. K. Chen, *Alcatel-Lucent Bell Laboratories, 600 Mountain Avenue, Murray Hill, New Jersey, 07974, USA.*

8:20 a.m.

O.2 A Large Swing, 40-Gb/s SiGe BiCMOS Driver with Adjustable Pre-Emphasis for Data Transmission Over 750 Ω Coaxial Cable

R. A. Aroca, S. P. Voinigescu, *University of Toronto, ECE Department of Electrical and Computer Engineering, Toronto, Ontario, M5S 3G4, Canada.*

8:40 a.m.

O.3 A 35-to-46-Gb/s Ultra-Low Jitter Clock and Data Recovery Circuit for Optical Fiber Transmission

H. Noguchi¹, K. Hosoya¹, R. Ohhira¹, H. Uchida², A. Noda¹, N. Yosida¹, S. Wada¹, ¹*NEC Corporation, Device Platforms Research Laboratories, 1753, Shimonumabe, Nakahara-Ku, Kawasaki, Kanagawa 211-8666, Japan.* ²*NEC Engineering, Ltd., Device Solutions Division, 1753, Shimonumabe, Nakahara-Ku, Kawasaki, Kanagawa 211-8666, Japan.*

9:00 a.m.

O.4 An Ultra-Wideband 7-Bit 5 Gbps ADC Implemented in Submicron InP HBT

B. Chan, B. Oyama, C. Monier, A. Gutierrez, *Northrop Grumman Space Technology Mixed Signal Products, Redondo Beach, CA 90278, USA.*

9:20 a.m.

End of Session O

9:20 a.m. - 10:00 a.m.

Coffee Break

SESSION P: High Performance Frequency Generation

10:00 a.m. – 11:20 a.m.

Grand Ballroom I – Hilton Portland & Executive Tower

Chairpersons: Peter Katzin, *Hittite Microwave Corp.*
Dan Scherrer, *Northrop Grumman*

10:00 a.m.

P.1 A Low-Power CMOS VCO for 2.4 GHz WLAN

Hyun Seok Choi, Quang Diep Bui, Chul Soon Park, *School of Engineering, Information and Communications University(ICU), 103-6 Munji, Yuseong, Daejeon 305-714, Korea.*

P.2 A 30 GHz Single-Chip PLL MMIC using 0.5 μ m Enhanced/Depletion-Mode GaAs pHEMT

Fan-Hsiu Huang¹, Cheng-Kuo Lin², Yu-Chi Wang², Yi-Jen Chan¹, ¹*Department of Electrical Engineering, National Central University, Chungli, Taiwan, R.O.C.,* ²*WIN Semiconductor Corporation, Taoyuan, Taiwan, R.O.C.*

10:40 a.m.

P.3 An Integrated 19-GHz Low-Phase-Noise Frequency Synthesizer in SiGe BiCMOS Technology

Sabbir A. Osmany, Frank Herzel, J. Christoph Scheytt, Klaus Schmalz, Wolfgang Winkler, *IHP, Im Technologiepark 25, 15236 Frankfurt (Oder), Germany.*

11:00 a.m.

P.4 A Low Noise Ku-Band SiGe Phase Locked Oscillator

Ahmed I. Khalil, Chris Lyons, Joy Gao, Chris Oneill, Michael Koechlin, *Hittite Microwave Corporation, Chelmsford, MA 01824, USA.*

11:20 a.m.

End of Session P

11:40 p.m. – 1:00 p.m.

Break for Lunch

SESSION Q: Advanced Device Technologies

10:00 a.m. – 11:40 a.m.

Grand Ballroom II – Hilton Portland & Executive Tower

Chairpersons: Freek van Straten, *NXP Semiconductor*
Mark Rocchi, *OMMIC*

10:00 a.m.

Q.1 RF MEMS Resonators: Getting the Right Frequency and Q (Invited)

J. Wang, *University of South Florida, Tampa, United States*

10:30 a.m.

Q.2 Recent Performance of Nonpolar/Semipolar/Polar GaN-based LEDs and LDs (Invited)

S. Nakamura, *University of California Santa Barbara, Santa Barbara, United States*

11:00 a.m.

Q.3 0.1 μ m n+-InAs-AlSb-InAs HEMT MMIC Technology for Phased-Array Applications

C. H. Lin¹, Y. C. Chou¹, M. D. Lange¹, J. M. Yang¹, M. Y. Nishimoto¹, J. Lee¹, P. S. Nam¹, J. B. Boos², B. R. Bennett¹, R. S. Tsai¹, D. S. Farkas¹, A. L. Gutierrez¹, M. E. Barsky¹, T. P. Chin¹, M. Wojtowicz¹, R. Lai¹, A. K. Oki¹, T. R. Block¹, ¹*Northrop Grumman, Redondo Beach, United States,* ²*Naval Research Laboratory, Washington D.C., United States*

11:20 a.m.

Q.4 Ultra-Wideband Ultra-Low-DC-Power High Gain Differential-Input Low Noise Amplifier MMIC Using InAs/AlSb HEMT

B. Y. Ma, P. S. Chen, J. Bergman, J. B. Hacker, G. Nagy, G. Sullivan, B. Brar, *Téledyne Scientific, Thousand Oaks, United States.*

11:40 a.m.

End of Session Q

11:40 p.m. – 1:00 p.m.

Break for Lunch

SESSION R: Front End Modules and Components

1:00 p.m. – 2:20 p.m.

Grand Ballroom I – Hilton Portland & Executive Tower

Chairpersons: Peter Zampardi, *Skyworks*

Jan-Erik Mueller, *Infineon Technologies*

1:00 p.m.

R.1 **Fully Integrated GaAs HBT MMIC Power Amplifier Modules for 2.5/3.5 GHz Band WiMAX Applications**

M. Miyashita¹, T. Okuda¹, H. Kurusu¹, S. Shimamura², S. Konishi², J. Udomoto¹, R. Matsushita³, Y. Sasaki¹, S. Suzuki¹, T. Miura¹, M. Komaru¹, K. Yamamoto¹, ¹*Mitsubishi Electric Corporation, Hyogo 664-8641, Japan.* ²*Wave Technology Inc.,* ³*Miyoshi Electronics, Japan.*

1:20 p.m.

R.2 **A Miniature Low Current Fully Integrated Front End Module for WLAN 802.11b/g Applications**

R. Vaidya, D. Gupta, M. Bhakuni, *RF Arrays Systems Pvt. Ltd. Nagpur-440 022, Maharashtra, India.*

1:40 p.m.

R.3 **A Current-Mirror-Based GaAs-HBT RF Power Detector for Wireless Applications**

K. Yamamoto, M. Miyashita, H. Kurusu, N. Ogawa, T. Shimura, *Mitsubishi Electric Corporation, Hyogo 664-8641, Japan.*

2:00 p.m.

R.4 **High Linearity Dynamic Feedback Darlington Amplifier**

K. W. Kobayashi, *Sirenza Microdevices, Torrance, CA 90505 USA.*

2:20 p.m.

End of Session R

SESSION S: LATE NEWS PAPERS

3:00 p.m. – 4:40 p.m.

Grand Ballroom II – Hilton Portland & Executive Tower

Chairpersons: Bill Peatman, *ANADIGICS*

3:00 p.m.

S.1 **Robust Broadband (4 GHz - 16 GHz) GaN MMIC LNA**

M. Micovic¹, A. Kurdoglian¹, T. Lee², R. Hiramoto², P. Hashimoto¹, A. Schmitz¹, I. Milosavljevic¹, P. Willadsen¹, M. Wetzel¹, M. Antcliffe¹, D. Wong¹, M. Hu¹, M. Delaney², D. Chow¹, ¹*HRL Laboratories LLC, Malibu, United States,* ²*Boeing, El Segundo, United States*

3:20 p.m.

S.2 **Demonstration of a 3-D HEMT Phase Shifter MMIC Utilizing a Five Layer BCB Process with Seven Metal Layers**

D. S. Farkas, J. Uyeda, J. Wang, W. Luo, R. Elmadjian, D. Eaves, K. Luo, R. Lai, M. Barsky, M. Wojtowicz, A. Oki, Northrop Grumman Corporation, Redondo Beach, United States

3:40 p.m.

S.3 **A Fully On-Chip, Single-Ended S-band Image Reject Mixer for High Dynamic Range Applications**

J. B. Lai¹, C. G. Christodoulou², ¹*Sandia National Laboratories, Albuquerque, United States,* ²*University of New Mexico, Albuquerque, United States*

4:00 p.m.

S.4 **Metamorphic HEMT Amplifier Circuits for Use in a High Resolution 210 GHz Radar**

A. Tessmann¹, A. Leuther¹, R. Sommer², H. Essen², ¹*Fraunhofer IAF, Freiburg, Germany,* ²*Fgan FHR, Wachtberg, Germany*

4:20 p.m.

S.5 **A 77 - 79-GHz Doppler Radar Transceiver in Silicon**

S. T. Nicolson¹, P. Chevalier², A. Chantre², B. Sautreuil², S. P. Voinigescu¹, ¹*University of Toronto, Toronto, Canada,* ²*STMicroelectronics, Crolles, France*

4:40 p.m.

End of Session S

PANEL SESSION 3:

Potential of future applications of the mm-wave CMOS: feasibility of 60GHz WLAN/WPAN in CMOS

1:00 p.m. – 2:30 p.m.

Grand Ballroom II – Hilton Portland & Executive Tower

Moderators: Sorin Voinescu, *University of Toronto*
Jean-Olivier Plouchart, *IBM*

60GHz WLAN/WPAN is emerging as a potential solution for multi-Gbit/s wireless communication. This could be a high-volume consumer market for high-definition video and high-bit rate data streaming. III-V is currently used in mmWave products. With CMOS scaling, FET performance has improved significantly, but is it good enough to design mmWave products? Can CMOS succeed at mmWave frequencies? With the escalating cost of nanometer CMOS product development and variability, does it make sense economically to use CMOS?

If a 60GHz wireless I/O is going to be integrated with a 45nm microprocessor, is a standalone 60GHz CMOS transceiver viable? Can a 130nm or 90nm CMOS solution compete performance-wise with a 45nm CMOS radio? Do any of the 60GHz 90nm and 130nm CMOS chips reported to date work at 100C? Is a 60GHz CMOS radio start-up going to survive unless it sells the IP to a microprocessor company? Does it make sense to have a 60GHz radio in SiGe BiCMOS addressing the indoor wireless HDTV market?

By better understanding what is technically and economically feasible, and what integration options exist, it is hoped that this panel will provide useful insight for IC developers.

Panel Members:

Mahbod Eyvazkhani	<i>Nokia Research Center</i>
Ali M. Niknejad	<i>Berkeley Wireless Research Center</i>
Gabriel Rebeiz	<i>University of California San Diego</i>
Jonghae Kim	<i>IBM SRDC</i>
Kenjiro Nishikawa	<i>NTT Research Laboratories</i>
Joy Laskar	<i>Georgia Tech</i>

2:30 p.m.

End of Panel Session 3

2:30 p.m. – 3:00 p.m.

Coffee Break

PANEL SESSION 4:

Which Switch Gets Ditched?

3:00 p.m. – 4:30 p.m.

Grand Ballroom I – Hilton Portland & Executive Tower

Moderators: Peter Zampardi, *Skyworks Solutions*
Peter Katzin, *Hittite Microwave Corp.*

The RF switching function is becoming ubiquitous and increasingly important in modern electronics from mobile handsets and cordless telephones to cellular infrastructure, wired and wireless broadband networks, automotive telematics to surface, air-, and space-born military radar, communication, and ECM systems. For example, the trend towards multi-mode, multi-band switching handset front-end modules requires compact, highly sophisticated band-selection/transmit-receive duplexing switches that must also meet stringent performance specifications. Other embedded applications include, amplifier bypass, phase shifters, and attenuators where high performance switches also play a critical role. Our panelists present and discuss the important aspects (and trade-offs) of competing compact RF switch technologies such as PIN diodes, pHEMT, SOS, and MEMs that must be considered for use in practical systems.

Panel Members:

Dylan Kelly	<i>Peregrine</i>
Domingo Farias	<i>TriQuint Semiconductor</i>
Heinrich Heiss	<i>Infineon Technologies</i>
Julio Costa	<i>RF Micro Devices</i>
Rick Cory	<i>Skyworks Solutions</i>
John McKillop	<i>Tera Vista Technologies</i>

4:30 p.m.

End of Panel Session 4

5:00 p.m.

Close of Symposium

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by September 20th to qualify for advance registration fee.

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NOTES