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NEWSLETTER

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IMS '97: A Mile High Success in Denver, P.17



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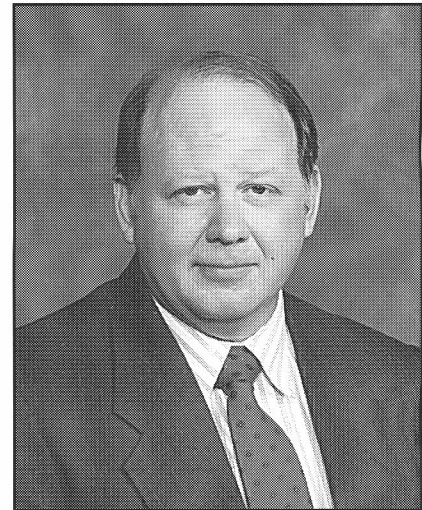
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Editor's Message

IMS '97 in Denver was fantastic. Claude Weil and his steering committee did an excellent job (see Claude's review in this issue).

I apologize for the lateness of this newsletter and expect the newsletter to be on track from now on. We have moved the publishing to the IEEE and Robin Edwards has been super. This newsletter is a combination of the IMS Summer newsletter and the Fall newsletter with new officer announcements.

As always we are looking for interesting articles to publish in the newsletter.

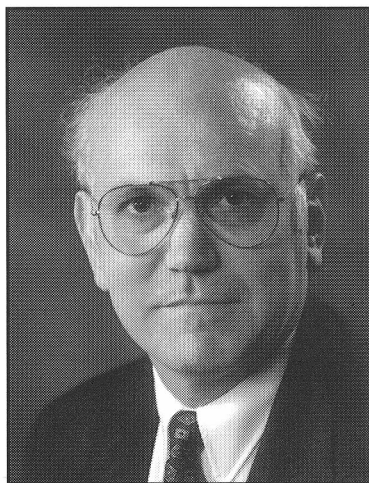
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Roger Pollard

It is a privilege and an honour to have been elected to serve as your President for 1998 and it is with some trepidation that I follow in the footsteps of the many distinguished individuals who have held this office. Our past Presidents have set a standard of commitment and service to our membership that will be very hard to maintain. You will see however, from the AdCom Committee Directory that we are fortunate to have a large number of individuals who serve in a volunteer capacity and who are committed to the best interests of MTT-S and providing the best possible service for our members. Our goal will be to ensure that microwave engineering continues to provide for the needs of Society and that we are educating ourselves and the next generation of microwave engineers to support that aim.

The continued success of the Microwave Theory and Techniques Society depends crucially on the participation of its members. I

President's Message

would encourage all of you to participate in the activities of the MTT-S.

Here are some suggestions:

- Plan now to attend the 1998 MTT-S International Microwave Symposium to be held in Baltimore, Maryland, June 7-12. Microwave Week is an event like no other in the technical calendar, with its mix of an exceptionally high quality technical programme, workshops, social events, and an exhibition that features every vendor of microwave-related services. Above all, Microwave Week provides the best possible environment for networking - an opportunity to meet your colleagues, share your ideas and to learn. MTT-S will once again be hosting the Members' breakfast at the IMS in Baltimore. All members are invited to come along, meet your friends and make contact with others working in your technical area.
- Consider joining one of the Society's 20 Technical Committees. The Technical Committees are responsible for promoting activity in each of the areas for which they are responsible. Amongst their activities are: the organisation of workshops and meetings, the production of publications and educational material in the

subject area and the identification of new and emerging technologies. If you would like to be involved and are willing to make a contribution please contact the appropriate the TC Chairman whose name, address and contact details you will find in the Committee Directory. Better still, come along to the MTT-S Members breakfast at the IMS in Baltimore in June, meet members of the committees and find out what it is all about.

- Write an article for an MTT-S publication. There is a wide range - from the informal quarterly Newsletter to IEEE Microwave and Guided Wave Letters, IEEE Transactions on Microwave Theory and Techniques and the IEEE Press MTT-S book series. Publishing a technical article is not necessarily just for the purpose of communicating new results to the world at large, but can also be used to provide a forum in which to debate ideas with colleagues and as a means of giving others opportunities to learn.
- Participate in the activities of your local Chapter. MTT-S has over 90 Chapters worldwide. If there isn't a Chapter near you, consider forming one - it only requires 12 members to sign a petition. There is

help available from our Membership Services Committee. There are opportunities within the Chapter organisation to participate in Committee work and to organise activities such as meetings, short courses, publications and social events.

In encouraging your active participation in Society affairs I would draw your attention to the tools that are available to make it easier to communicate with the AdCom and its Officers. The Committee Directory contains complete details of the Society's organisation including a comprehensive address book. However, you will find

that to electronic communication is the most effective way to find out about Society activities. The MTT-S home page on the World Wide Web (<http://www.mtt.org>) includes regularly updated information about our people, meetings and services as well as offering access to a steadily increasing volume of technical information. Of particular note is IEEE's OPeRA (Online PERiodicals Research Area) which provides electronic versions of the Transactions on Microwave Theory and Techniques and Microwave and Guided Wave Letters for subscribers without the delays of the postal system.

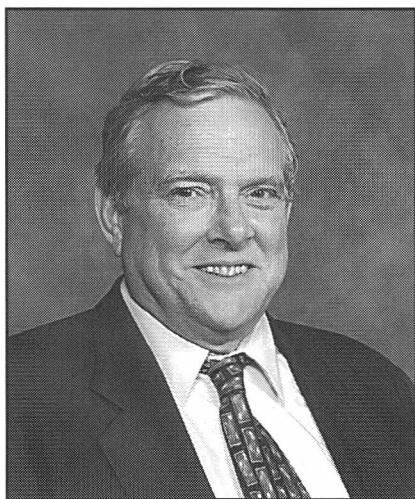
Electronic communication will play an increasing role as our Society becomes truly transnational.

The Society needs feedback to evaluate the services it provides to its members and I would urge you to communicate your ideas and suggestions to members of the AdCom. My efforts during 1998 will be directed towards encouraging member participation in Society activities and ensuring that the Society is responsive to the needs of its members, providing more and better services.

Roger D. Pollard
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MTT Society Ombudsman



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As your Ombudsman, I have received 15 inquiries from MTT-S members since the last reporting in the Spring 1997 Newsletter. Two members requested information on the qualifications to become a senior member and the procedure to apply. This information was given to them and is listed below. To become a senior member, the member needs to be an engineer, scientist, educator, technical executive or organizer in IEEE designated fields. The candidate shall have been in practice for at least 10 years and shall show significant performance over a period on at least 5 of those years, such performance including one or

more of the following:

- (a) Substantial engineering, responsibility or achievement, or
- (b) Publication of engineering or scientific papers, books or inventions, or
- (c) Technical direction or management of important scientific with evidence of accomplishment, or
- (d) Recognized contributions to the welfare of or engineering profession, or
- (e) Development or furtherance of important or scientific engineering courses in a "recognized education program" or
- (f) Contributions equivalent to those of (a) to (e) above in areas

such as technical editing, patent prosecution or patent law, provided these contributions serve to advance progress substantially in IEEE designated fields.

The member can apply and needs to have an IEEE member serve as a reference who will complete the IEEE Senior Member Grade Reference Form. A member can also nominate another member for senior member. To obtain the form call IEEE at (800) 678-4333 or (732) 981-0060. If you feel qualified for senior member, please apply.

Two members joined MTT-S and wondered why they did not receive their MTT-S Transactions or Microwave and Guided Wave Letters. In checking with IEEE, they did not include payment for these items when they paid their IEEE and MTT-S dues. I informed them of this and gave them the following 1997 US \$ payment schedule.

MTT-S membership includes receiving the MTT-S Newsletter and notices of upcoming events as well as many other benefits. Members may choose either or both of the above periodicals at the additional cost.

One life fellow member wondered why he was not receiving his MTT-S Transactions and Microwave and Guided Wave Letters. I checked with IEEE and a life or life fellow member who was a member of a society for 5 consecutive years prior to becoming a life member is entitled to free society membership and is entitled to the periodicals that the society offers with the membership fee. I told the member he qualified for free MTT-S membership but since MTT-S charges extra for the two enumerated periodicals, he needs to pay for the periodicals at normal price if he wants them. Two members requested copies of MTT-S articles which were provided to them and one member wanted to information on how to purchase a specific Symposium Digest. For Symposium Digests call IEEE at the number listed above and ask for Customer Service Department. One person wanted to join MTT-S. I told him the easiest way to join is over the phone to IEEE. Another IEEE member thought he was a MTT-S member and after checking IEEE found he did not apply.

One members wanted information on the effect of low level radiation on the body and another member wanted to know how the microwave oven causes water molecules to vibrate and how RF can be used to treat cancer. I contacted Dr. Ayre Rosen of David Sarnoff Research Center in Princeton NJ. who gave me the following information which was transmitted to the people. The Johns Hopkins Hospital in Baltimore has done studies on the effect of low level radiation on the eyes and the Oncology Department should be contacted for reports. Dr. Rosen has references for the effect of radiation on other parts of the body. In response to the second inquiry, water molecules are charged polarized (+ -). When excited with microwaves, the molecules respond to the alternating fields and move with the field. This causes friction and the molecules heat up. When Microwave and X-rays are applied simultaneously, cancer cells are differentiated from normal cells and tend to be killed off. Also the RF helps warm up the cancer cells and make them more responsive to chemotherapy.


One member requested information on a Denver 97IMS symposium plane/room/food/registration package so he did not have to make individual arrangements. I let him know that we do not have a combined package and gave him the information to make individual arrangements. One member wanted a particular

Item	Full year (Jan. to Dec.)	Half year (July - Dec.)
MTT-S Membership	\$8	\$4
MTT-S Transactions	\$13	\$6.5
MTT-S Microwave and Guided Wave Letters	\$8	\$4

MTT-S Series video tape. In checking, this tape was never made. Finally, one member wanted group MTT-S membership information. A contact

person was given to the person to obtain the information.

Please feel free to contact me by letter, telephone, FAX or e-mail concerning any complaint you

may have or any assistance you may need in obtaining membership services from IEEE and MTT-S. 

MTT-S AdCOM Nominations

Call for AdCom Nominations and Committee Appointment Suggestions



Reynold Kagiwada,
Chairman Nominations and
Appointments Committee

The MTT-S Nominations and Appointments Committee (N&A Committee) is actively soliciting candidates for the MT7-S Administrative Committee (AdCom). The N&A Committee consists of:

Eliot Cohen
(e-mail: e.cohen@ieee.org)
Tatsuo Itoh
(e-mail: t.itoh@ieee.org)
Peter Staecker

(e-mail: p.staecker@ieee.org)

Reynold Kagiwada

(e-mail: r.kagiwada@ieee.org)

Kiyo Tomi-yasu

(e-mail: k.tomiyasu@ieee.org).

The nominations for AdCom will be processed, in accordance with the MT7-S Bylaws and Procedures Manual. Nomination Procedure:

- Obtain "suggested" nominees from each member of the N&A Committee. Process must ultimately result in at least two nominees for each open slot.
- Chapter nomination submitted prior to July, 1998.
- Prepare a "Suggested Starting List of Candidates" of perhaps more than 40 names and solicit responses from Adcom.
- Committee shall down select, and seek acceptance of nomination and commitment to perform as expected, if elected from this reduced list.
- Assemble list of "suggested" nominees and prepare a "spread sheet" of biographical

information emphasizing MTr-S, IEEE, and other activities. Compile results. Inform President of slate.

- Prepare ballot for use at Annual Meeting. Petition candidates (signed by 25 M'17-S members, by July 1, 1998) are automatically included on the ballot.

All nominees will be contacted to ascertain that they will accept the nomination and will commit themselves for active participation in at least two meetings a year, held at various locations in

Present Elected AdCom (1998): Total = 18

Mid-Atlantic-/Eastern U.S.	4
Southeastern U.S.	1
Middle Region U.S.	1
Southwestern U.S.	2
Western U.S.	6
Europe	2
Asia-Pacific Region	2
Industry	10
Government	3
University	5

the United States.

The geographical and affiliation distributions of current AdCom members are given below:

In addition to the elections, the N&A Committee seeks interested and qualified individuals who will be recommended to the

president for his consideration to serve on various MTT-S committees.

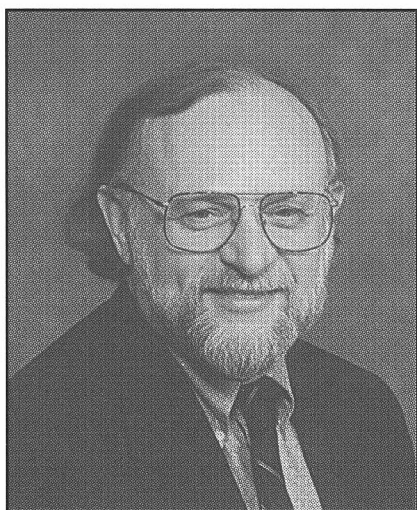
The N&A Committee is soliciting your help to suggest potential nominees to serve our membership as AdCom members. Please submit your suggestions to your local chapter

chairman, N&A Committee (by Email) and/or to R. Kagiwada, N&A Committee Chairman, TRW Inc., Mail Stop M5/1470, One Space Park, Redondo Beach, CA 90278 or FAX (310) 814-5483, by July 1, 1998.



Distinguished Microwave Lecturers for 1997-1998

Wide Bandgap Semiconductor Microwave Power Amplifiers



R.J. Trew
U.S. Department of
Defense
3080 Defense Pentagon
Washington, DC 20301-3080

Abstract

There is a need for solid state microwave sources that can operate

at high RF output power with high power-added efficiency and at high ambient temperature. Such amplifiers would find use in applications such as mobile communications base station transmitters, phased array radars, satellite transponders, etc. To date, solid state microwave amplifiers fabricated from conventional semiconductor transistors have been limited to the 10's to 100's of watt levels. Although kilowatt amplifiers have been reported they have required combining the outputs of a large number of devices and have proved difficult to fabricate. Generally, high power microwave sources use vacuum tube technology such as TWT's or klystrons. Recent advances in wide bandgap semiconductor technology, particularly the III-Nitrides and the 6H and 4H polytypes of SiC, offer the possibility of fabricating improved solid

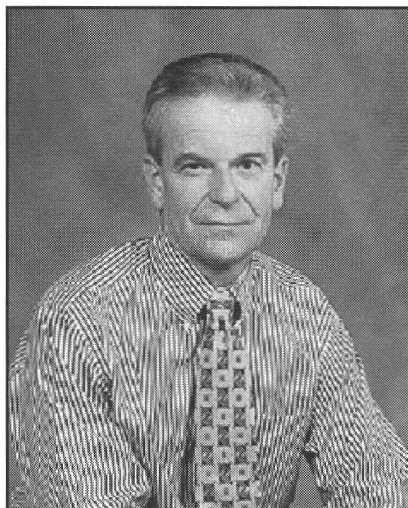
state electronic devices that can operate at power levels significantly in excess of that available from standard devices.

Microwave MESFET's have been produced in SiC and GaN and the SiC devices are approaching the commercialization stage. Microwave amplifiers with RF output power on the order of 3 W/mm and PAE as high as 67% at 850 MHz have been fabricated from 4H-SiC and amplifiers with about 2 W/mm and 45% PAE at 6 GHz have been fabricated from 6H-SiC. These results are nearing the performance theoretically predicted for these devices. Both HFET's and HEMT's can be fabricated using the AlGaIn/GaN heterojunction. The heterointerface yields a two-dimensional electron gas with sheet charge density on the order of 10^{13} cm^{-2} and low field mobility in the range of 5000-8000 $\text{cm}^2/\text{V}\cdot\text{sec}$. This permits both HFET's and HEMT's

with excellent high frequency performance to be fabricated. In addition, the critical electric field for breakdown is a factor of 3-5 greater than in Si and GaAs, and this permits electronic devices to support high bias voltages without experiencing breakdown. Static Induction Transistors (SIT's) with very good microwave performance have also been demonstrated, and a two-stage amplifier with 1 kW RF output power has been reported and is a commercial product for the HDTV market.

In this work the microwave performance of various devices fabricated from SiC and GaN-based materials is described and compared to similar devices fabricated from GaAs. Theoretical large-signal simulations of semiconductor device and amplifier performance are presented and used to explain the physical operation of the components. The operating principles of various transistors operating in class A and class B amplifier circuits will be discussed and design considerations for obtaining optimized performance presented. Elevated temperature operation is discussed. It is demonstrated that transistor amplifiers can yield RF output power on the order of 4-5 W/mm for SiC transistors and 10-12 W/mm for GaN-based transistors with power-added efficiency approaching the ideal values for class A and B operation.

MMICs for Wireless Communications - Design and Technology Tradeoffs



Dr. Gailon E. Brehm

Abstract

Wireless communications systems are being deployed rapidly throughout the world at operating frequencies from 800 kHz to 40 GHz. In addition, many existing systems are being upgraded, especially by conversion to digital modulation. The result is a very large unit volume business for handsets at 1 and 2 GHz and a smaller, but still significant, unit volume of base stations and other infrastructure radio links. The RF front end of all these systems uses or potentially uses monolithic microwave integrated circuits (MMICs) built in GaAs or silicon. This talk will emphasize the most challenging

requirements that flow down from digital communications systems and how circuit architecture and semiconductor technology choices are made to address these needs. The conflicting requirements at the lower and upper ends of the frequency range along with the diverse needs of handheld, space borne, and pole-mounted systems imply different choices of packages, circuit architecture, and semiconductors. Since the preponderance of new applications are for consumer and commercial systems, low cost is a must, and the impact of each tradeoff on overall system cost dominates. This talk will offer numerous examples and selected theory of use to the NMC designer.

Resume

Dr. Brehm manages NMC design within RF/Microwave GaAs Products, the NMC Business of Triquint Semiconductor (Triquint Semiconductor was formerly a part of Texas Instruments). In this role he is directing the development of a wireless product line in GaAs, adding parts in the important I - 5 GHz cellular/PCS bands and key communications bands from 20 to 40 GHz.

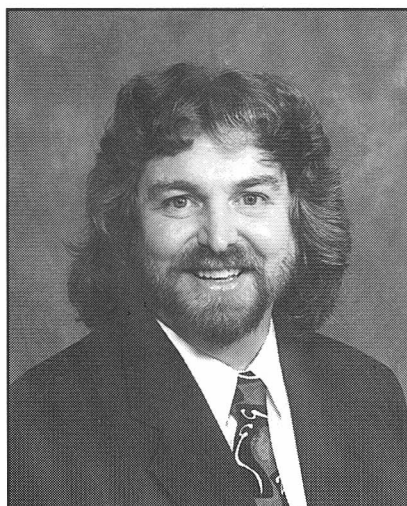
He has spent the past 30 years developing GaAs microwave devices, beginning with his PhD thesis at Stanford. Early industrial work included low-noise

GaAs FET development at Fairchild Semiconductor, Aertech Industries/TRW, and Rockwell International.

At Texas Instruments since 1978, his early work in ion implanted MESFETs using ebeam lithography led to development of single-chip monolithic radar module along with monolithic GaAs FET VCOs, monolithic LNAs, and a 5 - 10 Watt X-band monolithic power amplifiers. He was Technical Director for the NUMIC Program, a program that made possible affordable GaAs monolithic integrated circuits for a broad range of DoD systems.

Dr. Brehm is a fellow of the IEEE, holds five patents, has published more than 40 papers, and was chairman of the 1989 IEEE GaAs IC Symposium.

Low Voltage Microwave Electronics



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The presentation provides an overview of the low voltage/low power electronics developments and issues for portable wireless applications.

Issues related to the development of low voltage products that will be discussed include: semiconductor material choice, device technology choice, device modeling, circuit approaches, and system architectures.

Finally, key issues that will determine the lower limits that can be achieved in DC power and voltage reductions are discussed.

The basic components required for wireless applications (both commercial and military) are undergoing a revolutionary change in terms of their DC power consumption. Key drivers for this change include longer battery lifetime and reduced weight and size. In order to increase battery

lifetime, the power consumption of the individual components must be reduced. At present, the single largest volume and weight component in most portable electronics products is the battery. Therefore, a major impact on the mass and volume can be made by reducing the supply voltage (number of battery cells required) while simultaneously reducing

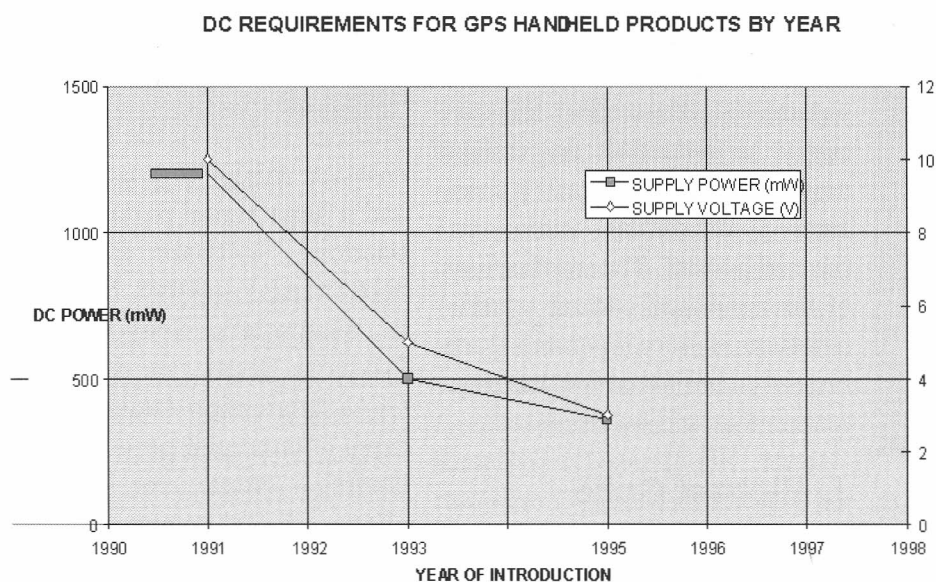


Figure 1. DC power consumption and battery voltage for hand held GPS products as a function of the year of introduction for those products.

power consumption (battery cell volume and weight).

Figure 1 shows the historical development of commercial GPS DC power requirements as a function of the year of introduction of the product.

Similar trends have been observed for cellular phones and pagers and this information will also be presented.

The constraints implied by the low voltage imperative can be examined as they apply to every aspect of RF/microwave component development. The full paper will discuss each of the following in detail:

Materials Technology (GaAs vs Si, epi vs implant, heterojunctions)

Device Technology (BJT, HBT, MESFET, MOSFET, HEMT)

Modeling Requirements (key challenges to modeling low voltage/low current operation)

Circuit Technology (topology challenges for low voltage)

System Design Issues (architecture trends and low voltage)

Since the reduction of battery size and weight is the key to the success of low voltage/low power electronics strategies, it is important to examine some fundamental issues related to batteries and the RF circuitry powered by them.

The issues that limit the DC power requirements for RF circuits are fundamentally different than those that limit the DC power requirements for

associated digital circuits in hand held products. Digital circuitry is required to store and analyze information — information that is encoded in a binary manner. This can be accomplished theoretically by the presence or absence of a single electron. Although practical considerations make the single electron memory improbable, and movement of that electron into and out of storage still requires energy, it is clear that binary data can be manipulated with extremely small amounts of energy. The system architecture does not impose arbitrary power requirements on the strength of the digital signal.

In contrast, the RF portion of hand held radios is required to transmit or receive signals over a distance. Because that distance can be large, and because power is lost in the radiation process, these functions must be able to handle power levels that are determined by the propagation media and transmitter-to-receiver separation. Thus, for RF circuitry, a reduction in voltage must be accompanied by increased efficiency and/or increased current. The implications of this increased current requirement on battery operated parts imposes a limit to low voltage operation that will be discussed.

J. Michael Golio

Michael Golio is the Technical Director of MMIC Design at Rockwell-Collins Avionics and Communications. His work

focuses on technical planning and direction of the development of MMICs for commercial and military avionics, for GPS, and for wireless applications.

Dr. Golio received his BSEE degree from the University of Illinois in 1976.

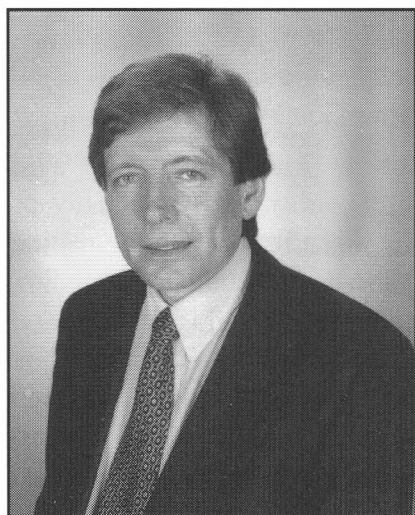
He worked for two years in the Microwave Tunable Devices Organization at Watkins-Johnson before returning to school to complete his MSEE and PhD degrees at North Carolina State University in 1980 and 1983 respectively.

His graduate research focused on microwave devices, non-linear models and carrier transport. Upon completion of his graduate work, he served as an Assistant Professor of Electrical Engineering at Arizona State University before joining Motorola Government Electronics Group in 1986. There he directed research on characterization, parameter extraction and modeling of non-linear microwave devices. This research resulted in several publications including the book *Microwave MESFETs and HEMTs* and a large signal parameter extraction software package, "GASMAP." In 1991, he moved to Motorola's Semiconductor Products Sector to develop a GaAs fabrication facility to address commercial products including chips for cellular phones, digital pagers and wireless LANs.

Mike has served the MTT-Society in several roles: as Chapter Activities Coordinator,

member of MTT-S Adcom, organizer for several MTT Symposium workshops and panel sessions, Liaison to IEEE Press, member of the Technical Program Committee on non-linear modeling, and co-chair of the MTT Technical Committees. He is a regular contributor of columns for the MTT-S Newsletter and he was elected Fellow of the IEEE in 1996.

Nonlinear High-Frequency CAD - The Key to Success in Wireless Design



Thomas J. Brazil

Abstract

Wireless technology has emerged as an increasingly attractive medium for digital communications - mobile telephony being the most conspicuous success to date, but other applications such as video delivery and broadband internet are also coming into view. Circuit and system

designers face major challenges to maximise performance, minimise cost and meet tight market opportunity windows. In this context, high-frequency CAD has become a critical enabling technology for the successful realisation of RF functions.

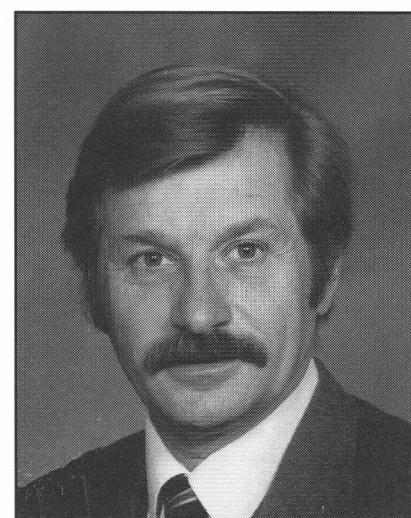
This talk will discuss two central concerns for this kind of CAD. In the first place effective non-linear device modelling is needed over a wide range of competing or complementary technology options (BJT, HBT, MESFET, HEMT or CMOS). Secondly, the complex digital modulation formats create a host of new simulation challenges, to describe obvious and more subtle system impairments over an exceptionally broad excitation signal bandwidth. A range of example will be given to illustrate the capabilities of existing non-linear CAD techniques and to identify some areas where further improvements are needed.

Breif CV

Thomas J. Brazil received the B.E. degree in Electrical Engineering from University College Dublin in 1973, and was awarded the Ph.D. degree in 1977 by the National University of Ireland. He subsequently worked on microwave sub-system development at Plessey Research (Caswell) UK. He returned to UCD in 1980, where he is now a Professor in the Department of Electronic and Electrical Engineering.

His research interests are in the fields of non-linear component modelling and device characterisation techniques, with particular emphasis on applications to microwave transistor devices such as the GaAs FET, HEMT, BJT and the HBT. He also has interests in nonlinear simulation algorithms and microwave sub-system design. He has worked in several areas of science policy, both nationally and on behalf of the European Union. This has included acting as Rapporteur for all Mobile Communications projects in the ACTS programme of the EU during 1996. He is currently Co-ordinator of the European EDGE project, which is the major ESPRIT project in the area of high-frequency CAD.

Microstrip Antennas



Robert E. Munson

Abstract

Microstrip Antennas are a

marriage of antenna and microwave technology on a monolithic structure. This structure often results in a conformal phased array.

This presentation will include the following on theory and applications of Microstrip Antennas:

- Microstrip antenna elements (linear polarized, dual polarized, multi-frequencies, and circular polarized)
- Wrap around microstrip phased arrays
- Fixed beam microstrip phased array
- Electrically scanned microstrip phased arrays
- Advanced printed antenna concepts

In addition, microstrip antennas offer many advantages including:

- Low profile since the antenna is usually the thickness of the substrate material used to photoetch the microstrip antenna
- Low cost because of the numerous components that are made from one piece of copper in a simple and

inexpensive photoetching process

- Very reliable because the connectors are replaced by a continuous piece of copper
- High performance because so many variables such as impedance and short line length are available to the designer

Microstrip antennas have found numerous applications in the areas of communication, radar, navigation, EW and remote sensing.

This is a summary of the presentation but Robert Munson would be happy to tailor his presentation to focus on areas of interest to the hosting group.

Biography

Born in Rensselaer, Indiana in 1940 and raised on an Illinois corn and soybean farm, Robert Munson later received his BSEE from the University of Illinois in 1963. He worked on conical spiral research for Dr. John Dyson while he was an undergraduate student.

From 1963 to 1967 he worked for Aeronautics in Newport Beach, California on conformal

re-entry vehicle antenna design. During this time he got a MSEE from the University of Southern California (USC), Los Angeles.

From 1967 until 1996 Robert Munson invented numerous microstrip antennas (30 U.S. patents) and started the antenna business for Ball Aerospace in Boulder, Colorado. He pioneered numerous microstrip antenna concepts in response to customer needs and was responsible for configuring these concepts for numerous applications. Since retiring from Ball in 1996, he has been a consultant on microstrip and photonic antenna problems.

He was a past distinguished lecturer for the Antennas and Propagation Society of IEEE.

Robert Munson is an avid outdoorsman enjoying many of the benefits of the pristine Colorado environment including hunting, fishing, camping and skiing. Also, a long time hobby has evolved into a thriving business in which Robert Munson breeds, grows, harvests and sells certified organic heirloom and heritage seeds and vegetables.



1997 IEEE MTT-S International Topical Symposium on Technologies for Wireless Application



Reynold Kagiwada
General Chairman

The 1997 IEEE MTT-S International Topical Symposium on Technologies for Wireless Applications was held on 23-26 February 1997 in Vancouver, B.C., Canada. Those who attended were treated to a truly beautiful city and an outstanding symposium. On Sunday, the "High Linear Power Amplifiers for Digital Communication Systems" Workshop had 82 people in attendance.


Over 600 people attended the Joint Plenary Session on Wireless Technologies. There were three outstanding speakers:

- Andrew Viterbi, Vice Chairman and Chief Technical Officer, Qualcomm - "Wireless Digital Communications: A Signal Processing Perspective"
- George Brody, Vice President Wireless Networks Technology, Nortel - "Wireless at the Crossroads: Network Challenges for the New Millennium"
- William Evans, President, EB Systems Limited - "Broadband Wireless Technology Employment in Canada"

Everyone enjoyed the plenary speakers, The audience stayed 15 minutes past the scheduled end time.

There were nine sessions with

40 papers, plus a panel session on "Global Wireless Applications." Session topics included: Wireless Technologies; Broadband Wireless Multipoint Systems; High Efficiency/Linearity Power Amplifiers; Novel Antenna Configurations for Emerging Wireless Product; Communication System; Application of Array Antennas to Wireless Systems; Global Wireless Communications; Coverage Issues in Personal Communications Systems; HBT for Wireless Applications; Design Considerations for Passive Components; and Advanced Technologies for Wireless Applications.

Frank Sullivan and George Heiter put together an outstanding technical program which 161 attendees enjoyed. Special acknowledgments go to Frank Sullivan, George Heiter, and Dick Sparks, our Finance Chairman. This is definitely an outstanding symposium to attend. 

Membership Services Committee

The Membership Services Committee hosted the Chapter Chairmans dinner at the 1997 International Microwave Symposium in Denver on Tuesday, June 10th. You might be

interested in goals and objectives outlined at the meeting and at a separate meeting with the Administrative Committee the previous weekend. This is, after all, your microwave

society, and those of us who have volunteered or have been elected are here to serve you and our industry. Each edition of the Newsletter will have information on the membership services

activities. Hopefully this will help you in the smooth running of chapter activities, identify some exciting initiatives or actions taken by the society or other chapters and prompt the local sections and chapters to keep the microwave activities in your area vital and growing.

MTT-S now has over ninety chapters worldwide, up from slightly over fifty in 1986. Our membership has dipped from over 11,000 in 1988 and 1989 to slightly over 9,000 in 1996. Our lowest year was 1995 but we are now gaining membership in large part due to the strength of the emerging telecommunications industry. If the activity at the membership booth in Denver at the International Microwave Symposium is any indication 1997 will be another "up" year. If you are currently a member (and you probably are if you're reading the newsletter) get at least one friend to join the MTT-S this fall. We have a dynamic future ahead in telecommunications and military microwave programs.

The MTT-S is the premier society in the industry. So, bring a friend.

As of May (usually the second lowest numerical count since all the dues have not been received) there are 7115 regular members and 1246 student members. Counting those members in other

categories such as 'retired' there are 8741 active members and 1711 in arrears. (Please pay your dues. You're late) for a total of 10,452 active and arrears' members.

Our objectives this year are:

1. Grow Membership.
2. Develop a Yearly 'Process' Schedule
3. Connect to the Chapters. Each ADCOM Member has four to six chapters to which they are liaison. Each ADCOM member will connect with each chapter at least twice a year.
4. Continue the Excellent Heritage Services provided.
5. Fill all open committee positions
6. Re-establish Student Membership Initiatives.
7. Establish a Common Database for Member Statistics (2-year project)
8. Analyze Demographics.
9. Publish a Membership Letter in Every Newsletter.
10. Revitalize the Transceiver Newsletter to Chapters.
11. Communicate, Communicate (Wed, Homepage for MTT-s, other)

This is a daunting list of activities. You will hear more about each of them as the months go by. Your chapter will definitely hear from the elected ADCOM members

this year. But, don't hesitate to call us with any concerns, questions, or achievements that you would like to share.

Before we go any further don't forget to read the articles by Samir El-Ghazaly and J.K. McKinney. Samir is now the Chairman of Chapter Activities. His excellent team is the focal point for your chapters interface with the Membership Services Committee.

J.K. McKinney is the most energetic Vice-Chairman I've ever seen. Our success as a committee will be due in large part to his knowledge, management skills, and energy. Don't miss his Chapter Chairman's article.

One other introduction is in order. Art Paoello is the new committee member in charge coordinating the funding for the Distinguished Microwave Lecturer Program. He can be reached at 610-354-2855. In a future Newsletter article you will get a closer look at the committee and their individual activities in a short biography- interview format.

Please let me know of any comments or questions that you have. In the meantime, help us serve you and help us grow.

Glenn Thoren
Chairman
Membership Services
g.thoren@ieee.org
603-885-2988



MTT-S Elections and AdCom Nominations



by Reynold Kagiwada
Chairman
Nominations and
Appointments Committee

AdCom Elections

On September 20, 1997, MTT-S held their election. There was an outstanding slate of candidates. Roger D. Pollard was elected president and Edward A. Rezek was elected vice president. The following individuals were elected to AdCom:

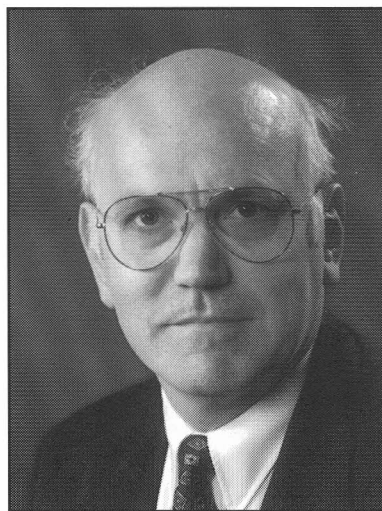
- S. Jerry Fiedziuszko (re-elected to second, three-year term)
- Kazuhiko Honjo (newly elected to three-year term)
- R. Tim Kemerley (re-elected to second, three-year term)
- J. Stevenson Kenney (newly

elected to three-year term)

- Roberto Sorrentino (newly elected to three-year term)
- Michael B. Steer (newly elected to three-year term)

Brief biographical sketches of Roger Pollard, Ed Rezek, and the newly elected AdCom officers are presented.

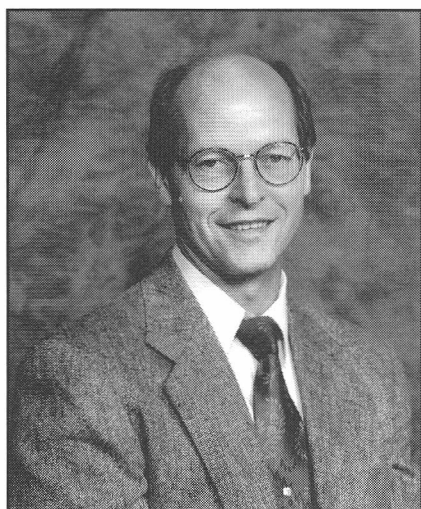
New Officers



Roger D. Pollard is the Hewlett-Packard Chair in High Frequency Measurements in the School of Electronic and Electrical Engineering at the University of Leeds where he has been a faculty member since 1974. He is Deputy Director of the Institute of Microwaves and Phonics which has over 40 active researchers, a strong graduate program, and has made contributions to microwave

passive and active device research. The activity has significant industrial collaboration as well as presence in continuing education through its Microwave Summer School. Professor Pollard's personal research interests are in microwave network measurements, calibration and error correction, microwave and millimeter-wave circuits and large signal and non-linear characterization. He has been a consultant to the Hewlett-Packard Company, Santa Rosa, CA since 1981.

Roger Pollard is a Chartered Engineer, a member of the Institution of Electrical Engineers (UK), and a Fellow of the IEEE. He is serving his second term as an elected member of the IEEE MTT-S Administrative Committee where he has served on the Membership Services, Publications and Budget Committees as well as playing an active role in the development of electronic communications and electronic publishing. He was a member of the Steering Committee of the 1996 IEEE MTT-S International Microwave Symposium held in San Francisco and was responsible for the CD-ROM version of the symposium Digest. He is the first non-U.S. member to hold the office of President of the Society.



Edward A. Rezek is presently a Senior Staff Engineer in the Electronics System and Technology Division. His current responsibilities include development and productization of optoelectronic components and ICs as well as advanced photonic subsystems for space insertion. Dr. Rezek received his B.S.E.E. and A.B. Physics from Washington University in St. Louis, MO, and his M.S. and Ph.D in Electrical Engineering from the University of Illinois. He holds four patents and has co-authored over fifty papers. Dr. Rezek has been at TRW since 1980. He has been involved in advanced technology development and manufacturing of optoelectronic components, optoelectronic ICs, and RF and mmW microelectronics components for communication and electronic systems at TRW. His work at TRW has ranged from basic research and development to production insertion. He headed the development of Advanced RF Microelectronics Products and Technology for

several years, being responsible for Advanced Microelectronics Materials, GaAs and InP Devices/Integrated Circuits, Heterojunction Bipolar Transistor Devices/Integrated Circuits, High Electron-Mobility Transistor Devices/Integrated Circuits, Millimeter wave, and GaAs and InP Reliability and Commercial/Space Qualification.

Dr Rezek became a student member of IEEE in 1970 as an undergraduate student; he became a full member in 1980. He is a member of the MTT, ED, and CPMT Societies of the IEEE. He is also a member of the American Physical Society, the American Association for the Advancement of Science, the JEDEC (Electronic Industry Association) committees on GaAs Reliability and Microelectronics Devices, and the NASA/JPL GaAs Reliability Advisory Group.

Dr. Rezek has been very active in MTT-S AdCom from 1992 - 1998. Activities include: Secretary (1992); Vice-Chairman, Meetings & Symposium Committee (1993); Co-Chairman, Meetings & Symposium Committee (1994); Vice-Chairman, Membership Services Committee (1995); Chairman, Membership Services Committee (1996); Coordinator, Winter Technical Meeting (1994, 1995); Member, Long-Range Planning Committee (1993-1996); Review Committee Member, MTT-S Fellowships and Scholarships (1995-1997); Member, Budget Committee (1995-1997);

Treasurer (1997); and Vice President (1998). Other activities include: Member TPC IMS (1991 thru 1998); Member, TPC for the MMWMC (1991); Reviewer, MTT-S Transaction Special Issues on the International Microwave Symposium; Co-Chairman, Finance Committee for the MTT-S 1994 IMS; and Vice-Chairman, 1997 IEEE MTT-S Symposium on Technologies for Wireless Application.

New AdCom Members



Kazuhiko Honjo is the Manager of Optoelectronics and High Frequency Device Research Laboratories, NEC, responsible for research development management for microwave and millimeter-wave HBTs, HBT integrated circuits for 10-40 Gbps fiber optic communication systems, HEMT LSIs, microwave Si power MOS MMICs, and device physics for compound semiconductors. Dr. Honjo received his B.E. from the University of Electro-Communications, Tokyo, Japan, in 1974, and M.E. and D.E. in

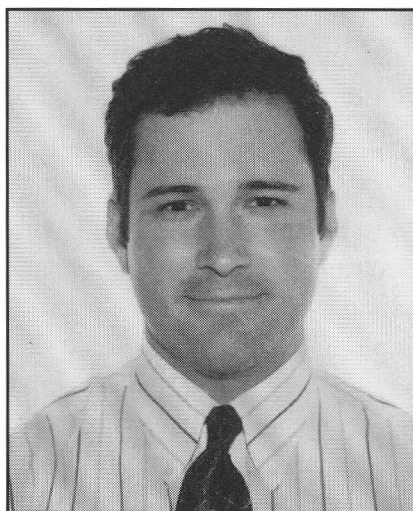
Electronic Engineering from the Tokyo Institute of Technology, Tokyo, Japan, in 1976 and 1983, respectively.

In 1976, Dr. Honjo joined the Central Research Laboratories, NEC Corporation, in Kawasaki, Japan. From 1976 to 1982, as a Member of the Technical Staff, he developed internal matching circuits for high power GaAs FETs and their applications to C-band, high power amplifiers and ultra-broadband amplifiers. From 1982 to 1987, as a supervisor of a MMIC group in NEC, he developed ion-implanted GaAs MESFET MMICs for a 12 GHz band Direct Broadcast Satellite Reception System and also established a fundamental, Self-Aligned Heterojunction Bipolar Transistor process technology. In 1987, he became a manager of research at the Ultra-High Speed Device Research laboratory, NEC. Since then, he has been responsible for device design, processing technology laboratory, and circuit applications for HBTs.

Dr. Honjo received both the 1983 and 1988 MTT-S Microwave Prizes. He also received the Young Engineer Award from the Institute of Electronics, Information, and Communications Engineers (IEICE).

Dr. Honjo served as a Visiting Lecturer at the Tohoku University in 1994, and has since 1997, served as a Visiting Professor at the University of Electro-Communications. He served as TPC member of MMT-S

Microwave and Millimeter-wave Monolithic Circuit Symposium (1988 - 1992), a TPC Secretary and a STC member for 1990 and 1994 Asia Pacific Microwave Conference, a TPC chairperson for Microwave Workshops and Exhibition (1993) which is cooperatively sponsored by MTT-S Tokyo Chapter, a treasurer of MTT-S Tokyo Chapter (1993 - 1994); a chairperson for APMC'98 General Affair Committee (1997); APMC AdCom member (1995 to present); a guest editor for special issues in *IEICE Transaction on Electronics* (1991, 1996). He holds 79 patents, has primary authored 65 papers, and co-authored 140 papers.

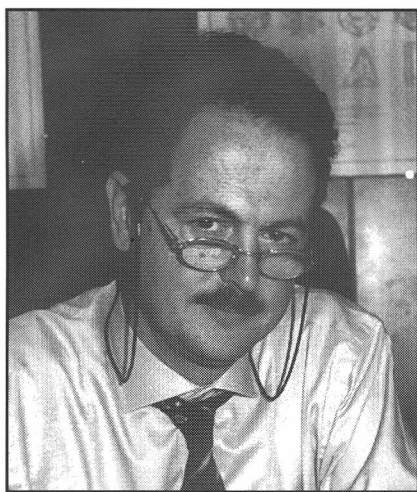


J. Stevenson Kenney joined Spectrian Inc., Sunnyvale, CA, in 1997, where he is a staff design engineer engaged in developing advanced power amplifiers for cellular communication systems. Dr. Kenney is also an instructor with the U.C. Berkeley Extension, teaching a course in RF subsystem design. His current research interests

include modeling nonlinear distortion of digitally modulated signals, and behavioral modeling of complex subsystems. Dr. Kenney graduated with honors from Georgia Institute of technology in 1985, obtaining a B.E. He later obtained the M.E. in 1990 while attending Georgia Tech part-time. His coursework concentration was in microelectronics, electromagnetics, digital signal processing, and applied mathematics. In 1992, he returned full-time to Georgia Tech to pursue further research in GaAs microelectronics at the Microelectronics research Center. He obtained the Doctor of Philosophy in 1994 under the direction of Professor William Hunt.

Dr. Kenney began his career at Electromagnetic Sciences, Inc., Norcross, GA in 1985, where he developed active microwave components for military and space flight applications. In 1988, he joined Scientific Atlanta, Norcross, GA, where he designed commercial satellite communications receivers. From 1991 to 1994, Dr. Kenney was self-employed while attending graduate school. He served as a consultant to SPC Electronics, Tokyo, Japan, where he aided in the development of VSAT terminals. In 1994, Dr. Kenney joined Pacific Monolithics, Inc., Sunnyvale, CA, where he managed the development of RFIC products for commercial applications.

Dr. Kenney has published more than a dozen technical papers in *the MTT-S Transactions* and five papers in the *IMS Digest*. He won First Place in the Student Paper Contest at the 1993 IMS. He currently is a member of the IMS Technical Program Committee in the area of Nonlinear Modeling and Simulation. Dr. Kenney is also on the Editorial Review Board of the *ETRI Journal*, Taejon, Korea. In 1993 and 1996, Dr. Kenney served on the IMS Steering Committee in Atlanta and San Francisco, respectively. He currently serves as Secretary for the Santa Clara Valley chapter of the MTT-S.



Roberto Sorrentino is the Chairman of the Electronic Institute and Director of the Computing Center. He presently is the Dean of the Faculty of Engineering at the University of Perugia in Perugia, Italy.

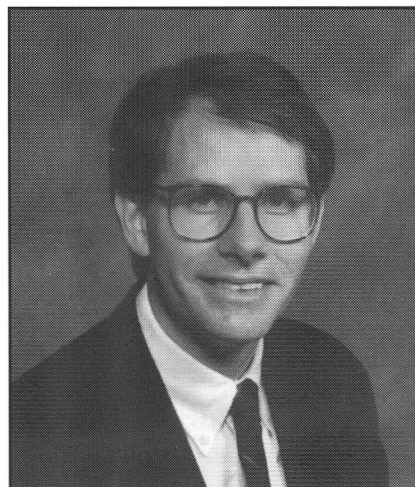
In 1971, Dr. Sorrentino joined the Department of Electronics of the same university, where he became an Associate Professor of Microwaves in 1974. He was

also Professore Incaricato at the University of Catania (1975-76), at the University of Ancona (1976-77), and at the University of Rome "La Sapienza" (1977-82), where he was an Associate Professor from 1982-86. In 1983 and 1986, he was appointed as a Research Fellow at the University of Texas at Austin, TX, USA. From 1986 to 1990 he was a Professor at the Second University of Rome "Tor Vergata". Since November 1990, he has been a professor at the University of Perugia in Perugia, Italy, where he was the Chairman of the Electronic Institute and Director of the Computing Center. Professor Sorrentino received his Ph.D in Electronic Engineering from the University of Rome "La Sapienza", Rome, Italy, in 1971.

Dr. Sorrentino's research activities have been concerned with electromagnetic wave propagation in anisotropic media, interaction of electromagnetic fields with biological tissues, and mainly with the analysis and design of microwave and millimeter-wave circuits. He has contributed to the planar-circuit approach for the analysis of microstrip circuits and to the development of numerical techniques for the electromagnetic modeling and design of microwave circuits both in conventional as well as printed circuit configurations.

Since 1990, Dr. Sorrentino has been a Fellow of the Institute of Electrical and Electronic

Engineers. From 1984 through 1987, he was the Chairman of the IEEE section of Central and South Italy, and was the founder of the local MTT/AP Chapter, that he chaired from 1984 to 1987. In 1994, he was the recipient of the MTT-S Meritorious Service Award. He is presently the Editor-in-Chief of the *IEEE Microwave and Guided Wave Letters*, a member of the Editorial Boards, the *IEEE MTT Transactions*, the *International Journal on Numerical Modeling* and the *International Journal of Microwave and Millimeter-Wave Computer-Aided Engineering*. From 1993 to 1996, he was Vice-Chairman of the Commission D (Electronics and Photonics) of URSI that he is now chairing for the Triennium 1996-1999. Since 1996, he is the Chairman of the Steering and Management Committees of the European Microwave Conference.



Michael B. Steer is the Director of the Electronics Research Laboratory and Professor of Electrical and Computer

Engineering at North Carolina State University. His expertise in teaching and research involves circuit design methodology. From a teaching perspective, he has taught courses at the sophomore through advanced graduate level in circuit design including basic circuit design, analog integrated circuit design, and RF and microwave circuit design, solid-state devices and computer-aided analysis and on RF and microwave circuit design which are broadcast nationally by the National Technological University. Dr. Steer received his B.E. and Ph.D. in Electrical Engineering from the University of Queensland, Brisbane, Australia, in 1978 and 1983, respectively.


Professor Steer's research has been directed at developing RF and microwave design methodologies. Throughout his career, this work has been closely tied to the development of microwave circuits and solving fundamental problems in both high-speed digital and microwave circuit implementations. His dissertation project focused on the design of parametric amplifiers

which use a single reactive device in a reflection amplifier to achieve amplification of microwave signals. The result of this work was the development of a method capable of simulating multi-tone signals in nonlinear microwave circuits. Early years were devoted to refining the nonlinear analysis techniques culminating in a general method for performing the analysis techniques culminating in a general method for performing the simulation of nonlinear microwave circuits and systems in the frequency domain. This was in addition to contributions to generic microwave circuit simulation technology.

An outgrowth of the microwave circuit design methodology work was the electrical performance modeling of packaging for high speed digital circuits including the characterization of interconnects in printed circuit boards, in multi-chip modules and in sub-tenth micron integrated circuits. Modeling is of great importance in microwave engineering and the modeling contributions at RF and microwave frequencies led

to the development of behavioral models of digital drivers and receivers. A converter (S2IBIS) written by his group to automatically develop behavioral models from a SPICE netlist is being used by upwards of 50 companies and has been incorporated in several commercial computer-aided engineering programs. This work also led to the development of novel area-efficient measurement techniques being used in characterizing the electrical performance of interconnects in high speed digital ICs.

Currently Professor Steer's interests are in the computer-aided engineering of quasi-optical power combining systems; the implementation of a two-dimensional quasi-optical power combining system; high efficiency, low cost RF technologies for wireless applications; and computer-aided engineering of mixed digital, analog and microwave circuits.

Dr. Steer is a senior member of the IEEE and is active in the MTT-S and was Secretary of the Society in 1997. 

New MTT Technical Committee MTT-17 on HF - UHF Technology

The IEEE Microwave Theory and Techniques (MTT) Society has formed a new technical committee (MTT-17) for HF,

VHF, and UHF technology. Its purpose is to help MTT to address the needs of the 26,000 RF engineers who work at

frequencies below 1 GHz. The new MTT-17 committee was formed by the MTT TCC at IMS'97 in Denver. Fritz Raab

(GMRR) and H. Clark Bell (HF+) are the co-chairmen. A focused session on HF/VHF/UHF RF-power amplifiers has been approved for IMS'98 in Baltimore (June). The tentative list of papers is:

D.Myer Commun. Power Feedforward power amplifiers for HF - UHF

B.Stengle Motorola Analysis of LINC vector signal combiner

R.W.Brounley Brounley Engr. Solid-state RF generators as plasma and laser drivers

R.Frey APT Capabilities of low-cost RF-power MOSFETs for HF and VHF

J.F.Davis Caltech Low-cost class-E power amplifier with sine-wave and D.B.Ruteledge drive

N.O.Sokal Design Autom. Capabilities of class-E power amplifiers from HF to microwave

Hopefully, other proposals for papers on HF - UHF technology will also be submitted for consideration for IMS'98. These papers may appear either in another HF/VHF session (given sufficient interest) or in other IMS sessions. HF/VHF/UHF technology is now represented on the Technical Program Committee (TPC) for IMS'98 in Baltimore. MTT-17's representatives are Fritz Raab (GMRR), Rick Campbell

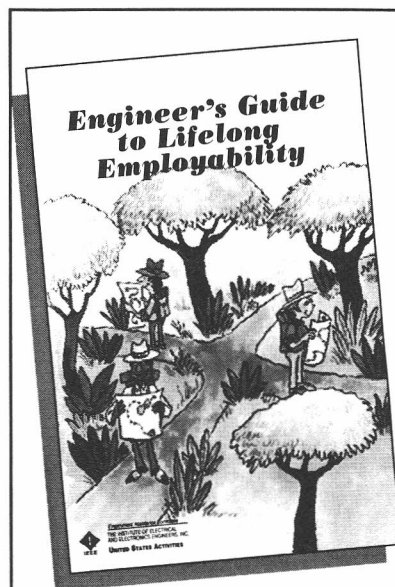
(Triquint), and Murat Eron (MPD Technologies).

Volunteers are sought to assist in two areas:

- Members of the MTT-17 committee, and
- Reviewers of papers on

HF-UHF technology.

Interested parties should contact F. H. Raab at Green Mountain Radio Research, 50 Vermont Avenue, Colchester, VT 05446, USA, Fax 802-655-9670, e-mail f.raab@ieee.org



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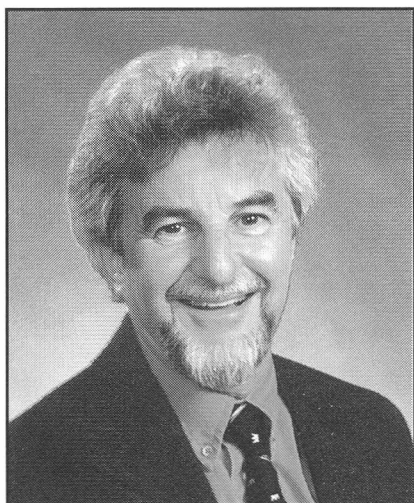
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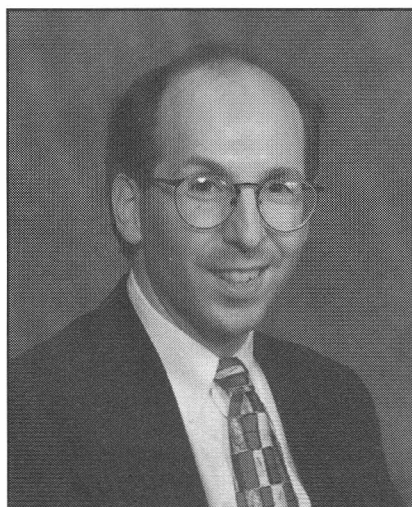
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The 1997 IEEE MTT-S International Microwave Symposium/Microwave Week:

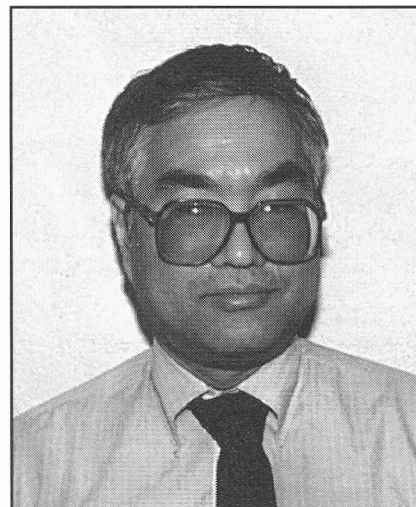
A Mile-High Success Story



by Claude M. Weil, Chair



Roger B. Marks, Vice Chair



Motohisa Kanda, Vice Chair

The IMS Returns to Colorado!

The 41st annual IEEE MTT-Society International Microwave Symposium (IMS), the primary event of the 1997 AMicrowave Week®, took place in Denver, Colorado during the week of 8-13 June 1997. The historic return of this event to Colorado occurred after a 24 year hiatus. It had been held twice before in Colorado: in 1962 at the laboratories of the then National Bureau of Standards in Boulder and again in 1973 on the campus of the University of Colorado in Boulder. Many extraordinary changes

have taken place in the MTT Symposium during the intervening years; details are given in Table 1, which demonstrates well the dramatic growth of this conference. Where once the IMS could be adequately accommodated in a small college town such as Boulder, this was no longer true by the 1980s and 1990s. The very large exhibition, which has become a major and very important adjunct to the conference, now dictates that the IMS can only be held in medium-to-large sized cities having major convention center facilities. The completion of the new Colorado Convention

Center in Denver in the early Nineties finally made it possible to bring the IMS back to Colorado in 1997.

Much of the credit for bringing the IMS back to Colorado belongs to the local IEEE section in Denver who, way back in 1989, first suggested the idea and began the process of bringing the MTT site selection committee to Denver. A preliminary Steering Committee was formed at this time, chaired by Hussein Haddad with John Dunn and Claude Weil as Vice Chairs, and a formal bid was put together and submitted to the MTT AdCom in Dallas, TX in May 1990. Much of the

TABLE 1 STATISTICS FOR RECENT AND PAST SYMPOSIA HELD IN COLORADO

EVENT	1962 IRE PG-MTT National Symposium	1973 IEEE PG-MTT International Symposium Microwave	1997 IEEE MTT-S International Symposium Microwave
Location, Dates	NBS Labs Boulder, CO 22-24 May 1962	University Colorado, Boulder, CO 4-6 June 1973	Colo. Convention Center Denver, CO 8-13 June 1997
IMS Attendance	465	586	2174
No. Papers Given	36 in 10 sessions, 1 track	119 in 15 sessions, 2-track	413 in 55 sessions, 5-track
Digest	1 Volume	1 Vol., 343 pages	3 Vols. 1830 pages
No. Panels & Workshops	None	3 1	6 24
TPC Members TPC Chair/Co-chairs	8 R. Beatty, NBS	50 R. Beatty & E. Komarek, NBS	240 K. C. Gupta & Z. Popovic, CU
No. Exhibitors	None	15	375; 521 Booths
Steering Committee Members	18	20	42
Steering Committee Members	G. E. Schafer, NBS	D. F. Wait, NBS	H. Haddad, Ball; C. M. Weil, NIST
Local Arrangements Chair	J. F. Brockman, NBS	R. L. Gallawa, ITS	R. Seeley

early leg-work, including negotiating our contract with the headquarters hotel, the Radisson, later the Adam's Mark Hotel, was capably conducted by Hussein, who regrettably had to resign his position as Chairman in 1994 owing to employment relocation. Claude Weil was subsequently promoted to Chairman, with John Dunn agreeing to take on the critical role of Treasurer. Because John is now on a sabbatical assignment in California,

his duties have been taken over by John Tary and John Dunn's Departmental Secretary, Helen Frey, who between them have been doing a truly superb job of settling our outstanding accounts and preparing for the required IEEE audit. At the time of Hussein's departure, the Vice Chair position was filled by Motohisa Kanda. A few months later, Roger Marks joined the Committee as a second Vice Chair and also agreed to serve as

ARFTG Chair. Roger became an indispensable work horse of the Committee, without whom the 1997 IMS simply could not have taken place. His contributions were enormous and he successfully recruited many additional volunteers into Committee service. Dave Wait, who had served as the Chairman of the 1973 IMS (see above), agreed to serve as our Protocol Chief and provided outstanding service in distributing complimentary rooms and



*1997 MTT Society President
Skip Bryan at Banquet.*

gifts to awards winners and other VIPs.

We began our work early, assembling a dedicated team of Steering Committee volunteers from the Boulder-Denver area. In the early years, we met once or twice a year, moving to a quarterly schedule by 1995. Our Secretary, Mike Janezic, faithfully kept excellent minutes of the Committee's deliberations and deserves high praise for his dedication. Because it had been so long ago since the IMS had last taken place in Colorado and because the conference had changed so much in the intervening years, we felt that it was critical to get to the IMS in order to learn how to do it! Starting with the 1994 IMS in San Diego we sent an increasing number of our members to attend the Symposium, many of whose travel expenses were covered by the Committee. We all felt that these experiences proved

invaluable and that the expense was very worthwhile. We also appreciate very much the support given us by the MTT Ad-Com, who arranged for Karl Varian to attend many of our Committee meetings in order that we might benefit from his considerable expertise in organizing past Symposia.

Microwave Week - Jam Packed with Events!

Today's IMS, which includes three days of technical sessions and three days of Workshops, is still only one component of what has now come to be known as "Microwave Week." This also includes two other conferences that are formerly sponsored by or affiliated with the MTT-Society: the Radio Frequency Integrated Circuits Symposium (RFICS, formerly the MMWMC Conference) and the Automatic RF Techniques Group (ARFTG) Conference. These take place at the beginning and end of Microwave Week respectively and many attendees register for more than one of these conferences. Dylan Williams and Roger Marks provided excellent service as the Steering Committee's liaison with the organizers of these two conferences. Another major component is the Exhibition, organized by Horizon House Publications, and its associated Microwave Application & Product Seminars. The social events have always been a traditional part of Microwave Week and include the IMS Awards



*Local Arrangements Chair,
Bob Seeley praying at feet of
1998 TPC Chair, Ed Niehenke?
(Actually Bob was trying to fix a
bad mike.)*

Banquet, the RFICS Reception, the *Microwave Journal*/MTT-S Reception and the Industry-hosted Cocktail Reception which precedes the Banquet. Lastly, a comprehensive Guest Program is always organized for accompanying spouses, including a Hospitality Suite and various tours/outings.

Publicity - Getting the Word out!

Any conference organizer knows that the key to success is to get detailed information out to as many of the potential attendees as possible. Ron DeLyster, our Publicity Chair, worked very hard to ensure that both the Advanced and Full Programs were published on schedule. He received considerable assistance in this from Roger Marks. Both worked with Amy Norcross of Horizon House Publications to develop a more compact

program than that used last year, which offered all of the essential Microwave Week information in an easy-to-use format. Also, because so many microwave professionals now have access to the World Wide Web, we put considerable effort into creating an information-packed Web site. By the time that the 1997 Microwave Week took place, nearly 8000 site visits had occurred. It was especially helpful to our many overseas attendees who often were still without any programs due to the tardiness of the mails. Jeff Jargon is to be commended for his outstanding efforts in creating our Web site.

Many other Committee members helped to widely publicize the upcoming IMS. Promotional Flyers were included in the local IEEE Section newsletter, the "RockIEEE Overlook," as well as at some of the local electronics trade shows. Claude Weil contributed the traditional IMS welcome to the May issue of the "Microwave Journal." Gerome Reeve, Dick Loewecke and Dick Ehret all helped to provide invaluable publicity within the local microwave and telecommunication industry.

Registration - More Records Broken in Many Categories

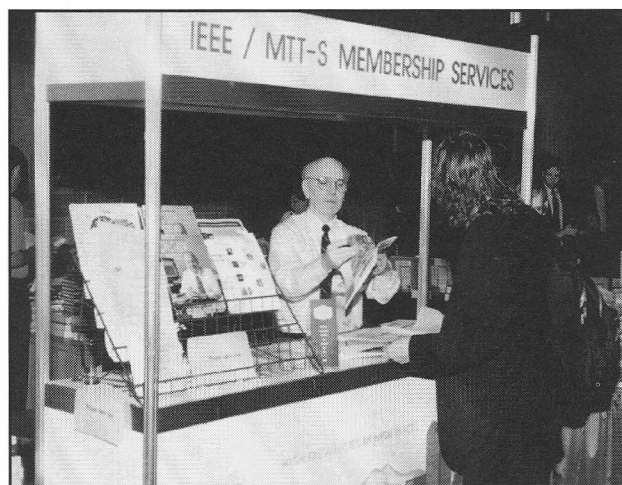
The registration statistics for the 1997 Microwave Week are given below :

TABLE 2
Registration Statistics
For The 1997 Microwave
Week Activities

IEEE MTT-S International Microwave Symposium	2174
RFIC Symposium	727
ARFTG Conference	205
TOTAL Conference Registration	2518
Panel Sessions (IMS & RFICS)	1453
Rump Session	180
Workshop Registrations	
Sunday	635
Monday	1230
Friday	910
	TOTAL: 2775
Exhibition Only	5781
TOTAL REGISTRATION (All Events)	8585

We consider these registration statistics to be really outstanding and far in excess of our most optimistic projections. By comparing these statistics with those published last year for the 1996 IMS, some interesting trends are readily apparent. Although the registration for IMS was down slightly from last year (2174 versus 2299), both the RFICS and ARFTG saw

very significant increases (close to 25% for both). It is clear that the RFICS is attracting a sizable and increasing proportion of the total conference registration, reflecting increased interest amongst attendees in the technical areas of interest to RFICS. An increase that is equally significant is in the number of workshops registered for (2775 versus 2496), further confirming a major growth trend that has now been evident for several years. The inescapable conclusion emerging from both our experiences and those of other organizers is that the workshop format is becoming very popular to many Microwave Week attendees. This is undoubtedly due to the more informal and slower pace of the workshop setting, which frequently allows for relaxed one-on-one interactions between the presenters and the audience and obviously frees the presenters from the kind of time constraints that they are subject to in the regular conference



1997 MTT Society Vice President Roger Pollard behind the IEEE Membership Services Booth.

sessions. The ever-increasing popularity of the workshops is a factor that needs to be paid attention to by all future conference organizers.

For the past three years, all IMS registration activities have been handled by Convention Data Services under contract to Horizon House Publishers. Our Registration Chair, George Jankovic, worked very hard indeed to coordinate the registration arrangements with both companies and to obtain changes which we had requested. Though the registration lines got very long on Sunday evening and Monday morning, George and several other members of the Steering Committee and local Denver IEEE Section provided invaluable service in processing registrants and in providing courteous assistance to those in need of special attention. We are truly grateful to everyone who helped out during a sometimes difficult and stressful process.

The Technical Program - Still the Best!

IMS Technical Sessions

The IMS is renowned for the very thorough review process that all potential technical contributions are subjected to, which always results in a very high-quality technical program. K.C. Gupta and Zoya Popovic, the Technical Program Co-Chairs deserve much praise and credit for once again putting together



Members of the IMS '98 Steering Committee at the 1998 TPC Meeting in Denver: Dennis Webb, Vice Chair Roger Kaul and Greg Burns.

an excellent and very relevant technical program which attracted considerable interest. Out of a total of 752 submissions, the IMS '97 Technical Program Committee (TPC) accepted a total of 413 papers for presentation at 55 technical sessions in a 5-track format. This represents a 55% acceptance rate. This year's organizers decided to end the afternoon sessions at 5:10 pm, thereby giving attendees a little more free evening time. Five of the 55 technical sessions were Focussed Sessions, organized by Motohisa Kanda; most dealt with very specific technical areas, but one was devoted to the history of microwave metrology at NBS/NIST in Boulder. Another regular session, dealing with developments in millimeter and submillimeter waves, was devoted to the memory of Sir J.C. Bose, an Indian physicist who performed some

extraordinary pioneering experiments at 60 GHz over a century ago (for more details, see below). Three of the regular sessions were jointly sponsored by both IMS and RFICS and one jointly by IMS and ARFTG. 132 of the 413 accepted papers were presented at two Interactive Forum (poster) sessions, which were very capably organized by John Norgard. These proved very popular with attendees, perhaps because the audience could discuss some of the issues presented by authors over snacks, fruit, wine and beer!

The majority of technical presentations during the 1997 Microwave Week strongly confirmed the important shift that the microwave industry has recently undergone from the earlier high-cost, low-volume environment of military applications to the present low-cost, high-volume environment of the

commercial marketplace. Many papers reported on state-of-the-art advances covering a very broad frequency spectrum in many of the booming fields of commercial telecommunication applications, such as wireless, PCS, fiber optics, MMDS, LMDS, etc.

Student Paper Competition

In addition, 32 of the platform presentations authored or co-authored by students were entered in the IMS Student Paper Competition, which this year involved three separate sessions. Stoyan Ganchev did an excellent job in organizing this contest. As a novel innovation in 1997, all student competition participants were awarded travel grants, intended to partially reimburse them for their travel expenses. This proved to be a powerful incentive for greater contest participation on the part of students and we hope that this precedent will be repeated at future Symposia. In order to offset some of these costs, we applied for and received a \$9000 grant from the National Science Foundation.

Panel Sessions and Workshops

Motohisa Kanda proved to be a very capable organizer of the panel and "rump" sessions. Six lunchtime panel sessions, five sponsored by IMS and the sixth by RFICS, and the evening rump session all featured presentations by invited panelists as well as



lively interactive discussions between the audience and panelists. A total of 24 workshops, 10 full-day and 14 half-day, were featured as part of the IMS Program on Sunday, Monday and Friday. The organization of these was directed by Don DeGroot, with assistance from Ajay Sreenivas and John Meredith, all of whom did a truly outstanding job. The workshops featured a tutorial or short-course setting for professional development in which attendees can closely interact with invited specialists. A bound set of Workshop Notes was provided to all participants. The Workshops covered important areas of emerging technologies, as well as business aspects, government regulations and web site design. This year, we hired a professional evaluator to help us better determine how workshop participants rate their learning experiences at these functions.

The Plenary Session

In order to further highlight the important commercial

telecommunication themes of this year's IMS, Roger Marks, organizer of the Plenary Session, invited two well-known speakers to discuss some new forms of telecommunications infrastructures. Bernard Bossard, chief technical officer and co-founder of CellularVision USA, discussed his company's pioneering work in 28 GHz local multipoint distribution systems (LMDS), which can potentially provide customers with wide-band wireless links for telephone, high-speed data and multi-channel TV applications at much reduced capital investment. The other plenary speaker, Robert Dixon, chief scientist of Omnipoint Corporation of Colorado Springs, questioned whether the real promise of PCS wireless communications, including high-speed data service, have been met. He concluded that, due to various factors, primarily economic, PCS is currently little more than digital cellular telephony operating on upper frequency bands. At the

conclusion of the Plenary Session, awards were presented by the MTT-S President, R.E. (Skip) Bryan, to the leaders of the 1996 IMS Steering Committee, led by Chairman E. J. Crescenzi, Jr., as well as three of this year's MTT-S graduate fellowship winners.

Publications

The work of the Technical Program cannot be considered complete until the IMS Digest is published. As evident in Table 1, this has now grown to a 3-volume, 12 pound monster! Our Publications Team, led by Digest Editor Gerhard Koepf, did an outstanding job in creating a high-quality IMS Digest and CD-ROM, with several thousand copies delivered well before the start of Microwave Week. Because of the many advantages inherent in the use of CD-ROMs as a storage medium, this year's publishing team followed the lead of the IMS '96 organizers in again presenting a free CD-ROM to all IMS and RFICS registrants. CD-ROM Editor Chris Jelks, with very capable assistance from Joe Donovan, deserve major credit for their considerable efforts in creating a much improved system that is more user-friendly and which can perform very fast title and abstract retrievals. This year, we included in the CD-ROM all of the IMS and RFICS technical papers as well as titles and abstracts of all MTT-S publications since 1989. Don Huebner and Charlie

Jackson provided invaluable support for the publication activities and, as always, Larry and Margaret Whicker of LRW Associates provided their traditional professional support to both the Technical Program Committee and our Publications Team. They play a truly indispensable role in many aspects of IMS planning! Last, but not least, Dick Booton was persuaded, probably against his better judgement, to abandon the luxury of semi-retirement in favor of assuming the editorship of the Special December Edition of the *IEEE Transactions on Microwave Theory and Techniques*. We are most grateful to Dick for taking on this major responsibility. Dick also undertook the responsibility for procuring the gifts for IMS speakers, session chairs and VIPs, all of which were suitably monogrammed with the IMS '97 logo.

The Exhibition and μ APS - Even Bigger and Better!

For many years now, the Microwave Week events have included the largest and most comprehensive Exhibition of its kind in the microwave industry, managed by Harlan Howe, Jr. and Howard Ellowitz of Horizon House Publications under contract to the MTT Society. This year's event, which posted a total of 521 revenue booths and 375 participating companies, even exceeded last year's record participation! This undoubtedly

reflects the renewed economic growth and sense of optimism which the microwave industry is currently enjoying. The early concerns of those who feared that Denver would not attract a very sizable exhibition audience were answered by the extraordinarily large and steady exhibition traffic, which astonished even the Exhibition organizers. This year's Exhibition included 16 University Booths, five of which occupied, for the first time, a full booth. Dick Ehret served very capably as our liaison person with the university departments.

The Microwave Historical Exhibit has always been a traditional part of the Exhibition and we are indebted to Dave Russell for his very hard work in putting on a very successful exhibit. Besides the historical artifacts that are normally loaned to IMS by the Historical Electronics Museum, Inc. of Baltimore, MD, there were some significant additions to this year's Historical Exhibit. These included some early microwave standards and instruments provided by the National Institute of Standards and Technology in Boulder, as well as a special display and live demonstration of the 60 GHz instrumentation used by the Indian physicist, Sir J.C. Bose, who performed many pioneering investigations into the quasi-optical properties of millimeter waves over a century ago. Those who visited the display were astonished to learn that such

sophisticated technology, including spark generators, waveguide filters, dielectric lenses, absorbers, semiconductor detectors, etc., were already being used by Bose at that time. By special arrangements, these artifacts had been brought to Denver by Prof. A.K. Sen of the University of Calcutta and Mr. D. Sen, the curator of the J.C. Bose Museum in Calcutta, and we are most grateful to them for participating in both the Historical Exhibit and the IMS Technical Program.

Following the precedent set last year, the Microwave Application and Product Seminars (mAPS) were again presented on the exhibition floor. Robert O'Rourke and Dick Loewecke did a first-class job of organizing a program of 38 papers which ran continuously during regular exhibition hours, including lunch, in a single-track format. These seminars, which were free to all technical registrants as well as the exhibition-only attendees, were intended to provide useful and up-to-date information on

new microwave products and techniques for design, manufacturing, marketing and managerial professionals. This year, we sought to better publicize the mAPS, including distribution of a one-page flyer to the exhibition-only registrants, and it appeared that these efforts did pay off through much improved attendance.

Local Arrangements - the Key to Conference Success

Our Committee was very fortunate to have recruited the services of Bob and Sharon Seeley who provided really outstanding service in leading our local arrangements team. It is almost impossible to detail all of their contributions, without which Microwave Week simply could never have taken place. They began their activities by negotiating contracts, many of which were very advantageous to us, with nine of the downtown hotels. For those contracts which included attrition clauses, the Seeleys worked very hard to reduce the potential risks to the MTT Society. When it became apparent that our reserved room block at these hotels was inadequate, the Seeleys hurriedly contracted with another seven hotels located at the former Stapleton Airport for additional rooms. Because of our event as well as other factors including the Oklahoma City bombing trial and the upcoming Economic Summit in



Denver, all of the downtown hotels were completely sold out during Microwave Week. By the time that the Housing Bureau had ceased taking IMS reservations, a total of 15,000 room-nights had been reserved with a peak of 3018 rooms on the Wednesday night.

The Seeleys also completed arrangements for the Technical Program Committee meeting, which met at the Adam's Mark Hotel over the weekend of 11-12 January 1997 (when the outside temperature rarely got above 10°F!). At this point in time, the Committee decided to hire Sharon Seeley as our "Events Coordinator" with primary responsibility for interfacing with the Convention Center and the Hotels on all catered events, as well as for organizing audio-visual arrangements throughout the Week. In order to prevent any conflict of interest, Sharon agreed to resign from the Committee as a voting member, but continued to attend our meetings. We are most grateful to Sharon for her truly dedicated service to the Committee as both a volunteer and paid employee. As if the Seeleys had not done enough, they still volunteered to organize our post-symposium party held in Breckenridge, CO over Labor Day weekend.

Many others on the local arrangements team made important contributions. Ray Kagiya served as our Convention Center Coordinator with

primary responsibility for liaison with the Convention Center staff and the Exhibition managers at Horizon House. Ray provided outstanding organization and support and throughout Microwave Week, he was truly a blur of activity! Anybody who visited the Convention Center during Microwave Week had to be impressed by the forest of signs everywhere! It was impossible to get lost! The person who deserves the credit for these is Christie Whitehead. We had all been impressed by the ease with which Scott Wettenkamp could create high-quality signs on site at IMS '96 in San Francisco and decided to adopt the same technology. Christie secured her own plotter and succeeded in overcoming many software problems to produce hundreds of signs that were equal in quality to Scott's. Many thanks to Christie, who did all this with little help from others while almost seven months pregnant!

Bob Seeley also played an important role in organizing volunteers and temporary help to assist with registration and many other activities. He received some assistance in this from Attila Weiser and Jonathan Scupin who tried to recruit student help for us. Despite their best efforts, we did not find many volunteers, probably because most students had already left the area for the summer.

The Social Functions and Guest Program

Yet another very important part of the work of the local arrangements team is in organizing the various social functions for which Microwave Week is traditionally renown. The first event was the RFICS Reception, which took place at the Denver Marriott Hotel on Sunday evening. This was followed by the traditional *Microwave Journal*-MTT Reception, held at the Denver Museum of Natural



After the Awards: "Four Hands, Two Grands" Piano Entertainment by Larry Wagoner and John Kite at the Awards Banquet, June 11.

History on Monday evening. For this function, the Museum was reserved exclusively for our use and included free access to all of the museum exhibits as well as an IMAX film. As an innovation to this year's IMS, we hosted a complimentary breakfast for all MTT members on both Tuesday and Wednesday mornings. This provided members with an opportunity to interact with MTT AdCom and TPC members as well as renew old friendships and chat with colleagues. Tuesday evening found many IMS participants and their guests at Coors Field in lower downtown Denver to watch the Rockies-Braves baseball game.

However, the premier social event continues to be the IMS Awards Banquet, which was very ably organized by Carol and Andy Repjar. Some 600 people attended this event in the Grand Ballroom of the Headquarters Hotel, the Adam's Mark, on Wednesday evening. At this function, the 1997 MTT-S awards were presented by the MTT Society President, R.E. "Skip" Bryan, and Honorary Life Fellow Ted S. Saad. In addition to recognizing the major microwave awardees and presenting the new IEEE Fellows (for further details, see Dave McQuiddy, "1997 MTT-S Awards," this edition), certificates of recognition were also presented to the outgoing MTT-S President, J. W. Wassel, and three retiring AdCom

members, J.M. Golio, D.C. Webb and R.E. Lehmann. Presentations were also made by Stoyan Ganchev to the winners of the IMS Student Paper Contest (1st Place Winner: Katherine Herrick of the University of Michigan). Following the awards ceremony, attendees were treated to "Four Hands, Two Grands" Piano entertainment by Larry Wagoner and John Kite of Denver. In addition, Carolie Coates did a great job of organizing the two VIP functions, namely the Chairman's Dinner, held on Tuesday evening, and the Chairman's Reception held prior to the Banquet on Wednesday.

Due to its close proximity to Colorado's magnificent Rocky Mountains, Denver is always a very popular tourist attraction. Consequently, many attendees brought their spouses and families with them. They enjoyed a varied and well-balanced Guest Program, consisting of a program of in-town tours, featuring some of Denver's cultural attractions, as well as two out-of-town tours to the Rocky Mountain National Park and to Colorado Springs. We also provided a Hospitality Suite for our guests at the historic Brown Palace Hotel in Denver. Robbie Marks did an outstanding job of planning this program and also took care of the various shuttle bus arrangements as well as negotiating reduced airline and car rental rates for attendees.


Acknowledging the Contributions of a Super Steering Committee Team!

To repeat an old cliché!, the secret of success (and the 1997 Microwave Week was an enormous success by any standards) is a team of dedicated, committed and hard-working individuals. Without any doubt, such a description fits the 1997 IMS Steering Committee. Hopefully, the contributions of every member has been acknowledged in this article (if there are any who have been omitted, we sincerely apologize). As we all know, the IEEE relies almost entirely on unpaid volunteers to organize its conferences and other functions. There is very little reward in this hard work, much of which is done on the volunteer's own time, other than the satisfaction of working together toward a common and worthy goal and of knowing that everyone gave it their very best effort. Nor is there ever enough recognition given to these dedicated people, many of whom toil unrecognized and in anonymity. To all of our outstanding Committee members, we want to say a big "thank you" and hope that this short tribute will help recognize their dedication, hard work and accomplishments.

An undertaking of this magnitude cannot possibly succeed without the professional support

and encouragement given to Committee members by its various employers. We wish to acknowledge this generous support, particularly that given by the National Institute of Standards and Technology, which

was an official technical cosponsor of the Symposium, as well as the Hewlett-Packard Co., which contributed prizes for the Student Paper Contest, plus a grant to assist in defraying expenses associated with the Historical

Exhibit. We also acknowledge the support of the National Science Foundation which provided a grant to help defray student travel expenses. 

1997 MTT-S Student Paper Competition – Strong Growth in Student Participation

By
Stoyan I. Ganchev,
Chairman
Hewlett-Packard Company

G. Rick Branner,
Session Chairman
University of California,
Davis

Introduction

For the past eight years, the IEEE Microwave Theory and Techniques Society has provided the forum for a Student Paper Competition for participants from universities throughout the world. This competition has been conducted as a facet of the International Microwave Symposium. For the second year in succession, student participation has undergone a significant increase. This year's participation has increased 35% from 1996 levels (which had experienced a 100% increase over the 1995

session). This growth continues to be a strong affirmation of the concept of a separate session to which students can focus their attention in a forum for which the quality of their research can be assessed on an equitable and consistent basis.

This year several innovations enhanced the attractiveness of the session for student participants. Most notable among these was the monetary support of up to \$500 for each domestic student (\$800 foreign) to help defray the cost of attending the symposium.

The primary objective of the competition is to recognize and reward research that has been conducted primarily by an individual student in the field of microwave theory and techniques (in contrast with large group projects or work in which a student's advisor played the p

e primary role). The major motivation for this event is the realization that the future of our society depends on our ability to attract young and enthusiastic students to the exciting field of microwave physics and engineering. This year's contest was indeed a strong confirmation that we are meeting our basic objectives. We had one really international competition which showcased extremely bright, talented and well prepared participants.

Student papers are traditionally submitted directly to LRW Associates as regular Symposium papers; however, each contest paper is designated as a "Student Paper" to permit the appropriate contest information to be disseminated subsequent to the Technical Program Committee (TPC) review. This process ensures that the quality of the

student contest papers was comparable to that of other papers in the Symposium.

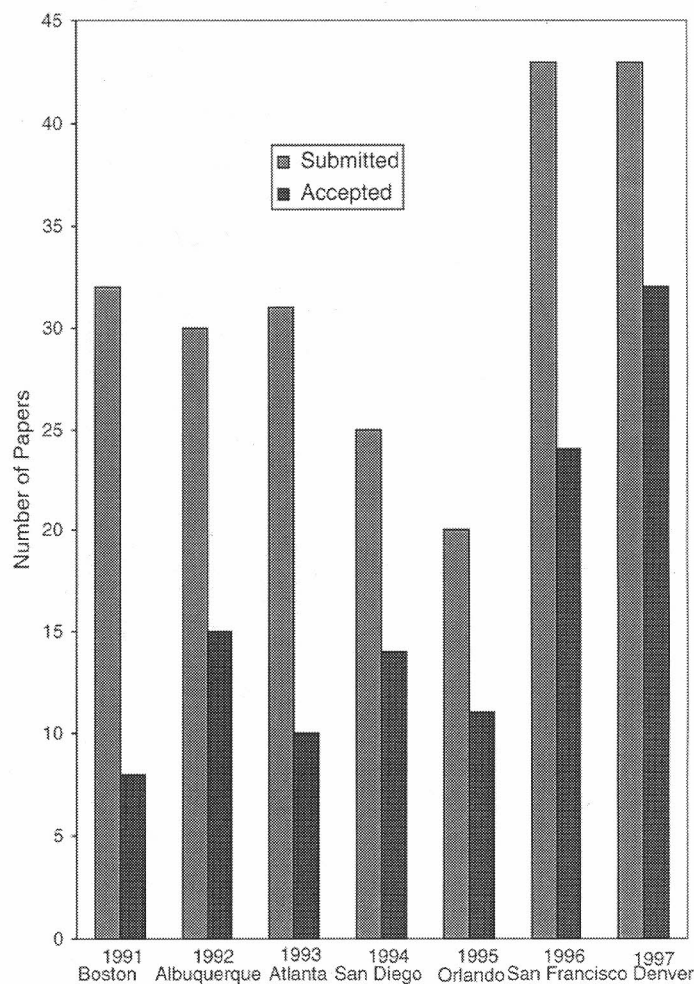
Student authors of papers accepted for regular Symposium sessions (oral or open forum) were invited to participate in the competition which was held in three contiguous sessions on Wednesday morning and afternoon of the Symposium. This procedure permitted all contest submissions to be evaluated on an equal basis, independent of how they were presented in their assigned regular Symposium sessions. The contest results were announced and prizes presented at the Awards Banquet the same evening. In manner similar to previous Symposia, calculators donated by the Hewlett-Packard Company as well as monetary prizes granted by the MTT-S were given to the winners.

Contest Submissions

There were 43 student papers submitted to the Technical Program Committee for the 1997 Symposium. These papers were marked explicitly as student contest papers, but were evaluated by the Technical Program Committee without any special consideration of their status as such. Of these, 32 were accepted for presentation in a regular session, and these authors were invited to present their work at the special contest sessions. The country distribution of the accepted papers was 21 from USA, 3 from Canada, 3 from UK, and

TABLE 1: Numbers of student papers submitted, papers accepted for presentation, and contest participants for recent Symposia.

Year	Location	Papers Submitted	Papers Accepted	Contest Participants
1991	Boston	32	8	7
1992	Albuquerque	30	15	12
1993	Atlanta	31	10	9
1994	San Diego	25	14	12
1995	Orlando	20	11	11
1996	San Francisco	43	24	23
1997	Denver	43	32	31



1 each from Belgium, Australia, Germany and France. Of the accepted papers, 31 students decided to participate. Table 1 and Figure 1 show statistics for submissions, and contest participants for the 1991-1997 Symposia.

These statistics quantitatively demonstrate the strong increase in student papers submitted and accepted over the past two years. This year the number of papers submitted was the same as in the previous; however, there was a 35% increase in those accepted and presented. This establishes an excellent trend in the quality of the submissions.

Pre-Contest Activities

Letters of congratulation were sent to all student authors whose papers were accepted for the Symposium. These letters provided information about the time, location and format of the contest session, pointing out explicitly that their participation would require an additional oral presentation of their work at the session. For efficient future communications, each student was requested to respond directly to the contest chairman via email. The letter also included information about student housing available at moderate cost in Denver University dormitories. This option was taken by many student participants.

This first letter also made the web address of the symposium available. The web page always

contained up-to-date information about the Student Paper Contest. This proved to be very helpful for the students and is one of the recommendations for future symposia.

A second letter was sent to the student authors which provided information about the available monetary support. This will be discussed in more detail below.

Potential judges for the student paper contest were solicited at the Technical Program Committee meeting in January 1997, in a presentation by the Student Paper Contest Chairman. Three people responded at the Technical Program Committee meeting. Consequently, the Chairman invited additional judges. Approximately thirteen potential judges were contacted, including four previous student paper contest chairmen. Of these, nine agreed to participate (including the Chairman) and, subsequently, took part in the Student Paper Contest. The names and affiliations of these judges, whose time and effort are greatly appreciated, are:

- John M. Owens, Auburn University, USA
- Michel H. Thursby, Florida Institute of Technology, USA
- G. Rick Branner, University of California, Davis, USA
- Robert C. Owens, Microwave Concepts, USA
- Stoyan I. Ganchev, Hewlett-Packard Company, USA
- John Wineman, Hewlett-

Packard Company, USA

- Alwyn J. Seeds, University College London, UK
- Jozef Modelski, Warsaw Institute of Technology, Poland
- Herbert Zirath, Chalmers Technical University, Sweden

Previous contest sessions had involved either five, seven (1992) or ten (1996) judges. A minimum of four to five judges is recommended to ensure that the overall evaluation of the contest presentations is uniform and fair.

Cash prizes of \$500, \$300 and \$200 were provided by the MTT-S for first, second and third place winners, respectively. As in previous years we solicited donations of electronic equipment from the Hewlett-Packard Company. The prizes provided by HP were as follows:

- First Prize: One HP 48G Calculator
- Second Prize: Two HP 38G Calculators
- Third Prize: Four HP 32S Calculator

First, second and third prize certificates were printed subsequent to the judging session and presented to the winners.

For the first time this year "monetary support" was available for "all" the students participating in the Competition. This support was for a maximum \$500 for the students from North America and \$800 for overseas students. The support covered travel, lodging expenses and

meals. There were two sources for these funds: a grant from NSF (for US students), and MTT-S monetary support voted from the 1997 Steering Committee (for overseas students).

Dr. Roger Marks of NIST, Boulder (Vice Chairman of the Symposium) was instrumental in preparing the proposal for the grant received from NSF.

Contest

Three contest sessions were held on Wednesday, June 11 from 10:10 - 11:50, 1:20 - 3:00 and 3:30 - 5:10 at the Microwave Symposium in the Colorado Convention Center. The chairmen for each of these sessions were respectively:

- Stoyan I. Ganchev, Hewlett-Packard Company
- John M. Owens, Auburn University
- G. Rick Branner, University of California, Davis

The room in which the session was held seated approximately 200 people, and approximately 80 people attended the sessions.

Based on this and last year's outstanding success and improved attendance, it is believed that the Student Paper Presentations should be a regular session held during the daytime sessions of the conference. This demonstrated an increase in attendance beyond the students, their advisors, and a few interested people. Evening sessions have been shown to be hampered by other

conflicting Symposium activities as well as non-conference related activities. The students would appreciate a larger audience, and, as this is an excellent session with an emphasis on presentation as well as technical content, all symposium attendees should have a more convenient opportunity to attend.

Each contestant was allowed eight minutes for his or her oral presentation and three minutes for questions. Because of the papers added after the Program was finalized (due to errors in our original database) it was necessary to adhere as closely as possible to the schedule. Attendance at the contest session was open to all who had registered for the Symposium, including advisors of the student contestants. The entire session lasted seven hours, ending at 5:30 PM. All papers were presented within the specified time frame. The judges met immediately after the student presentations and finalized the order of finish of the first three places.

Since inception [1], it has been traditional to judge each student's presentation on the basis of technical content (15 Points), clarity of presentation (10 points), and visuals (5 Points). In so doing, a standard evaluation form was employed, which has been developed over the past eight years. The contest judges, were very pleased with the overall quality of the student papers and their presentation in this year's contest. It is highly

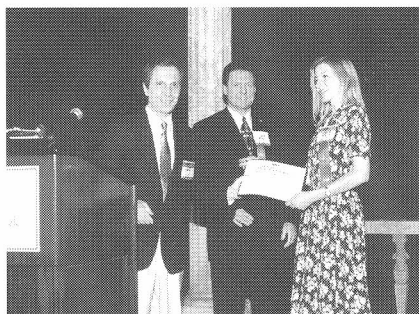
recommended that evaluation of the student papers by the TPC as regular Symposium papers be continued.

The above procedure was originally developed by the initiators of the student papers sessions in the late 1980's. Notable among those were Professor Ronald L. Carter, who was a founder of the session and Professor John M. Owens, who was and still continues to be a heavy contributor. In recent conversations [1], these professors continue to express strong support for the competition in every facet of its present format. In particular, this relates to current paper selection criteria, judging based on content, presentation and visuals, daytime sessions and monetary support.

An effort was made to facilitate the 15 points technical content judging by the judges. The idea was to provide some guiding grade for the judges based on the TPC score of this paper. This concept could not be implemented this year since not all subcommittees returned their grades. It is recommended next year this process to be improved. This will provide for improved assessment of technical content.

Each student was provided with a ticket to the banquet and all of the students were requested to sit at designated tables. The winners were not notified, a priori to maintain the element of surprise. The winners were called one by one (third place, second and

first), {photographed (see pictures)} and awarded certificates {by Chairman Stoyan I. Ganchev with President of the MTTS, R. E. (Skip) Bryan, looking on}. Checks for the cash awards were distributed the next day. The following students were winners in the 1997 student paper contest:



First Place

Katherine J. Herrick, University of Michigan, Ann Arbor, MI
W-Band Micromachined Finite Ground Coplanar (FGC) Line Circuit Elements

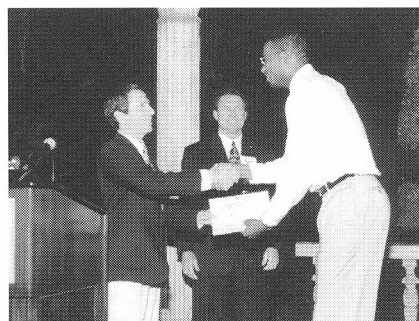


Third Place

Paul M. Watson, University of Colorado, Boulder, CO
(Prof. K. C. Gupta for Paul Watson)
EM-ANN Modeling and Optimal Chamfering of 90 Degree CPW Bends with Air Bridges



Amarildo J. C. Vieira, Drexel University, Philadelphia, PA
Nd:LiNbO₃ Microchip Laser with 20 GHz Subcarrier



Second Place

Joel L. Dawson, MIT, Cambridge, MA
An Adaptive Antenna Integrated with Automatic Gain Control for Receiver Front End



Alfred R. Perkons, UCLA, Los Angeles, CA
TE Surface Wave Power Combining by a Planar 10-Element Active Lens Amplifier



Stoyan I. Ganchev



N. Scott Barker, University of Michigan, Ann Arbor, MI
An Octave Bandwidth Monopulse Processor



Kenneth Leong, James Cook University of North Queensland, Townsville, Australia
Measurements of Unloaded Q-Factor of Transmission Mode Dielectric Resonators


The names, paper titles and affiliation of the winners were included in the banquet slide show prior to the banquet. At the Awards Banquet two separate slide projectors were used. One was showing the prize (e.g. First Prize) and the other one the name and affiliation of the author and the title of the paper.

Conclusions

The 1997 Student Paper Contest continued the healthy tradition of growing numbers and quality of the presented student papers.

The predominant opinion of the judges and other Student Paper Contest attendees is that we are really very successful in attracting the most capable students from our universities.

References

- [1] Private communication, Professor Ronald L. Carter, University of Texas, Arlington and Professor John M. Owens, Auburn University. 

Call For Nominations to MTT-S Awards

**By Peter W. Staecker
Awards Committee
Chairman**

Nomination forms are now available for the 1999 IEEE MTT-S Awards. We all know of deserving individuals who are recognized by their peers as being worthy candidates for the prestigious MTT-S Awards. Please take the time to nominate your deserving colleagues for a suitable MTT-S award or for the Fellow award so that others may be aware of their accomplishments. We will make sure that all nominations will be evaluated in a fair and professional manner.

Fellow Award Nominations are due 15 March 1998!

Fellow award kits may be obtained by contacting the IEEE Awards offices:

Ms. Sandy Schumacher
Phone: (732) 562-3843
Fax: (732) 981-9019
e-mail: fellow-kit@ieee.org

MTT-S Awards Nominations are due 1 July 1998!

Nomination forms may be

obtained by contacting:

Dr. Peter W. Staecker
M/A COM, Inc.
Corporated R&D, M/S L3
100 Chelmsford St.
P. O. Box 3295
Lowell, MA 01853-3294
Phone: (508) 656-2607
Fax: (508) 656-2777
e-mail: p.staecker@ieee.org

The MTT-S Awards are listed below with a description of the requirements for each award and the previous honorees by year:

Microwave Career Award

Prize: Certificate, a plaque and an honorarium of \$2,000

Eligibility: A career of meritorious achievement and outstanding technical contribution by an individual in the field of microwave theory and techniques; individual must be a member of IEEE.

Basis for judging: Publications in technical journals, presentation of lectures, contributions to the advancement of microwave technology, and other technical contributions considered in

conjunction with any or all of these areas of contribution; nominations are considered annually; award is made aperiodically.

Award

1973
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1998

Recipients:

W. Mumford
H. Wheeler
H. Riblet
J. Whinnery
E. Weber
A.G. Fox
S. Cohn
W. Kleen
K. Tomiyasu
A. Oliner
A. Matsumoto
M. Hines
J.R. Pierce
N. Marcuvitz
H.M. Barlow
G.L. Matthaei
R.W. Beatty
L. Young
A. Cullen
H.F. Cooke
R.A. Pucel
S. Okamura
T. S. Saad
L. Lewin
H. Dring
Y. Konishi
W.J. Getsinger
J.H. Bryant
R. Levy
H. Sobol

Pioneer Award

Prize: Plaque and an honorarium of \$1,000.

Eligibility: Publication of contribution in an archival journal, an individual or team not exceeding three persons. Deceased persons are ineligible for nomination. Preference may be given to IEEE members.

Basis for judging: Proposed award is to recognize an individual(s) who has made a major, lasting contribution in the field of interest of MTT S at least 20

years prior to the year of the award.

Award	Recipients
1990	Hatsuaki Fukui
1991	Robert H. Dicke
1992	Robert M. Barrett
1993	Claud E. Cleeton Lester Hogan
1994	Michiyuki Uenohara
1995	William C. Brown
1996	Kaneyuki Kurokawa
1997	Ali E. Atia Albert E. Williams
1998	G. Ross Kilgore

Microwave Application Award

Prize: Certificate and an honorarium of \$1,000

Eligibility: Outstanding application of microwave theory and techniques by an individual to create a new device, component or technique; novel use of a device or component; or any combination of the above.

Basis for judging: The most outstanding application of microwave theory and techniques by an individual or team of individuals; nominations must be submitted by a member of the Society; nominations are considered annually; award is aperiodic.

Award	Recipients
1974	Dean F. Peterson, III
1975	James F. White
1976	Martin G. Walker
1977	Stephen I. Long
1978	Dale H. Claxton
1979	Erwin F. Belohoubek
1980	Julius Lange
1982	Charles R. Boyd, Jr
1983	Les Besser
1984	Paul Meier
1985	James Cheal
1986	C. Burke Swan
1987	(No Award)
1988	Louis S. Napoli Masumi Fukata

1989	Kenneth L. Carr
1990	Allen F. Podell
1991	Eric W. Strid K. Reed Gleason
1992	Bernard Hershenov
1993	Irv Reingold John Carter
1994	Martin V. Schneider
1995	Cheng Paul Wen
1996	Kikuo Wakino
1997	(No Award)
1998	Randall E. Lehmann David D. Heston

Distinguished Educator Award

Prize: Plaque and an honorarium of \$1,000

Description and background: The creation of this award was inspired by the untimely death of Prof. F.J. Rosenbaum (1937-1992), an outstanding teacher of microwave science and dedicated MTT-S AdCom Member/contributor. This award is to be presented to a distinguished educator in the field of microwave engineering and science who exemplifies the special human qualities of the late Fred J. Rosenbaum who considered teaching a high calling and demonstrated his dedication to MTT-S through tireless service.

Eligibility: The candidate must be a member of IEEE and MTT-S at the time of nomination.

Basis for judging: The awardee must be a distinguished educator, recognized, in general, by an academic career. It is desirable for the candidate to have received other teaching awards. The effectiveness of the educator should be supported by a list of

graduates in the field of microwave science, who have become recognized in the field. Relevant letters of support are encouraged. The candidate shall also have an outstanding record of research contributions documented in archival publications. The candidate shall have a record of many years of service to MTT-S.

Award	Recipients
1993	Arthur A. Oliner
1994	Paul D. Coleman
1995	G. P. Rodrigue
1996	George I. Haddad
1997	David B. Rutledge
1998	Robert J. Trew

Distinguished Service Award

Prize: Plaque and Certificate

Eligibility: Significant contributions and outstanding service to the Microwave Theory and Techniques Society and the microwave profession over a sustained period of time.

Basis for judging: Service to AdCom and IEEE. Nominations considered aperiodically and awards made aperiodically.

Award	Recipients
1983	Theodore S. Saad
1984	Alvin Clavin
1985	G. P. Rodrigue
1986	Harold Sobol
1987	Kiyo Tomiyasu
1988	Fred J. Rosenbaum
1989	Don Parker
1990	H. George Oltman, Jr.
1991	Charles T. Rucker
1992	Richard A. Sparks
1993	Stephen Adam
1994	John B. Horton
1995	Reinhard H. Knerr

MSG continued in next MSG



Calendar MTT-S Sponsored Conferences

1998

Name	Date/Location	Involvement	
Radio Frequency Integrated Circuits Symposium (RFIC'98)	7-9 June Baltimore, MD USA	Co-Sponsor	Vijay Nair Motorola, Inc. 2100 E. Elliot M/S EL508 Tempe, AZ 85284 Tel: 602-413-5922 FAX: 602-413-5934 email: v.nair@ieee.org
MTT-S International Microwave Symposium	7-12 June Baltimore, MD USA	Sponsor	Steven N. Stitzer Northrop-Grumman Tel: 410-765-7348 FAX: 410-993-7747 email: s.stitzer@ieee.org
Automatic RF Techniques Group (ARFTG)	12 June Baltimore, MD USA	Affiliated	John Gregory Burns Northrop Grumman P.O. Box 1521, MS 3K13 Baltimore, MD 21203 Tel: 410-765-7331 email: burns.john@postal.essd. northgrum.com www.ieee/mtt/mtt.html
1998 International Conference on Mathematical Methods in Electromagnetic Theory (MMET-98)	2-5 June Kharkov Ukraine	Technical Co-Sponsor	Alexander Nosich Dept. Computational Electromagnetics IRE NAS Ulitsa Proskury 12 Kharkov 310085 Ukraine email: alex@emt.kharkov.ua
1998 Radio & Wireless Conference (RAWCON'98)	9-12 August Colorado Springs Colorado USA	Co-Sponsor	Dr. Robert B. Marks NIST 325 Broadway, 813.06 Boulder, CO 80303-3328 Tel: 303 497 3037 Fax: 303 497 7828 email: r.b.marks@ieee.org
International Symposium on Signals, Systems & Electronics	29 Sept-2 Oct Pisa Italy	Technical Co-Sponsor	Prof. Marco Luise University of Pisa Dept. Information Engineering Via Diotisalvi 2 56126 Pisa, Italy Tel: 39 50 568662 Fax: 39 50 568522 email: luise@iet.unipi.it

Calendar MTT-S Sponsored Conferences

1998

Name	Date/Location	Involvement	
1998 Emerging Technology Symposium of Wireless Communications & Systems	1-2 October Dallas, TX USA	Cooperative Sponsorship	Dr. Kris Agarwal Raytheon/TI 3928 Wilshire Drive Plano, TX 75023 Tel: 927 995 1882 Fax: 927 995 1398 email: k-agarwal@ti.com
European GaAs Applications Symposium	5-6 October Amsterdam The Netherlands	Cooperative Sponsorship	Dr. G. Gatti ESA/ESTEC P.O. Box 299, NL-2200 AG Noordwijk The Netherlands Tel: 31 71 565 6040 Fax: 31 71 565 4596
European Microwave Conference	6-8 October Amsterdam The Netherlands	Co-Sponsor	Prof. Ir.L. Ligthart IRCTR, Delft University Mekelweg 4, NL-2628 CD Delft Tel: 31 15 278 1034 FAX: 31 15 278 4046
MTT-S European Wireless '98	8-9 October Amsterdam The Netherlands	Sponsor	Prof. Ing. G. Fettweis Technische Universitat Dresden Stiftungslehrst Mobile Nachrichtensyst Tel: 49 351 463 3943 FAX: 49 351 463 7255
High Performance Electron Devices for Microwave & Electronic Applications (EDMO'98)	23-24 November Manchester England, UK	Technical Co-Sponsor	Dr. Mohamed Missous Dept. of EE U MIS T Sackvill Street Manchester M 60 10D England, UK Tel: 44 161 200 4797 Fax: 44 161 200 4770 email: missous@umist.ac.uk
1998 Asia-Pacific Microwave Conference (APMC'98)	8-11 December Yokohama Japan	Cooperative Sponsorship	Prof. Yoshio Kobayashi c/o REALIZE INC. 4-1-4 Hongon, Bunkyo-ku Tokyo 113, Japan Tel: 81-3-3815-8590 FAX: 81-3-3815-8529 email: rlz@ppp.bekkoame.or.jp

Notes: (1) Meetings listed are those that have been officially sponsored by MTT-S (i.e., AdCom approved). There are many other microwave related meetings (chapter sponsored, commercial, etc.) that are not listed.

MTT-S Continuously Sponsored Conferences

MTT-S International Microwave Symposium (IMS)

Annual (Sponsor)

Automatic RF Techniques Group (ARFTG)

Semi-annual (Affiliated)

European Microwave Conference (EuMC)

Annual (Cooperating)

Asia Pacific Microwave Conference (APMC)

Annual (Cooperating)

MIOP

Biennial - 1993, etc. (Cooperating)

MIKON

Biennial - 1994, etc. (Cooperating)

Combined Optical and Microwave Earth and Atmospheric Sensing

Biennial (1993, etc.) (with GRSS-S, LEO-S)

International Microwave Conference/Brazil (SMBO)

Biennial - 1993, etc. (Cooperating; Co-Sponsor 1995)

IEEE GaAs IC Symposium

Annual (Co-Sponsor)

IEEE Conference on the Computation of Electromagnetic Fields

Biennial - 1992, etc. (Cooperating)

European GaAs Applications Symposium

Biennial - 1992, etc. (Cooperating)

Topical Meeting on Electrical Performance of Electronic Packaging

Annual (Sponsor)

19th International Conference on Infrared and Millimeter Waves

Annual (Cooperating)

Microwaves in Medicine

Triennial - 1993, etc. (Cooperating)

National Radio Science Meeting

Annual (Cooperating) (with International Union of Radio Science)

Int'l Workshop on High Perf. Electron Devices for Microwave and Optoelectronic

Applications (EDMO)

Annual (Cooperating) (with UKRI MTT/AP/Leo Joint Chapter and King's College London)

Cornell University Conference on Advanced Concepts in High Speed Semiconductor Devices and

Circuits Biennial (Technical Co-sponsor) (Sponsored by the IEEE Electron Device Society)

1997 MTT-S Awards

by **Dave McQuiddy**
Chairman, MTT-S Awards
Committee

The nomination processes for the MTT-S Awards and the IEEE Fellows are publicized in the *MTT-S Newsletter*. Nominations can be made by any member to recognize deserving individuals for the various awards. The selection process for the MTT-S Awards started after the nomination deadline of 1 July 1996 and the results of the selection process were first announced in the Fall AdCom meeting which was held in September 1996. The nominations for the IEEE Fellows were due 15 March 1996 and the results of the Fellow Evaluation process were announced by IEEE Headquarters on 1 December 1996. A listing of the annual Microwave Awards including the new IEEE MTT-S Fellows was published in the official program of the 1997 International Microwave Symposium and in the *1997 International Microwave Symposium Digest*.

In addition to the MTT-S Awards and Fellows, the Awards Committee and the President in consultation with AdCom Committees recognize the achievements of those key individuals who have given extraordinary service to our microwave profession by presenting them with Certificates of

Recognition. These awards were announced during Microwave Week and were presented in the Plenary Session of the symposium by our President, R. E. "Skip" Bryan, after the keynote addresses by Bernard B. Bossard and Robert C. Dixon. Those receiving Certificates of Recognition are :

Dr. Randall E. Lehmann, Secretary of AdCom 1996

Dr. J. Michael Golio, Member of AdCom 1994-1996

Dr. Denis C. Webb, Member of AdCom 1994-1996

Dr. E. James Crescenzi, Jr., *Chairman*, 1996 International Microwave Symposium

Dr. Joseph S. Barrerra, *Vice-Chairman*, 1996 International Microwave Symposium

Dr. S. Jerry Fiedziuszko, *Co-Chairman Technical Program*, 1996 International Microwave Symposium

Dr. Derry P. Hornbuckle, *Co-Chairman Technical Program*, 1996 International Microwave Symposium

Dr. George D. Vendelin, *Chairman Local Arrangements*, 1996 International Microwave Symposium

Dr. Mahesh Kumar, *General Chairman*, 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium

Mr. Ken Wong, *Chairman*, 47th

Automatic RF Techniques Group Conference

Prior to presenting the 1997 MTT-S Fellows awards during the Awards Banquet, our MTT-S Honorary Life Member, Theodore S. Saad, sorrowfully announced that Dr. John H. Bryant had died the previous day, 10 June 1997. John Bryant had received the Microwave Career Award last year in recognition of his many and diverse contributions to the Microwave Theory and Techniques Society and to the microwave profession in general. He had served as Chairman of the MTT-S AdCom in 1970 before the title was changed to President. After recounting some of John's salient contributions including his well-known developments in the miniaturization of microwave circuits and interconnections, Ted Saad asked those in attendance at the Awards Banquet to join in a celebration of the life of John Bryant. *Resquiescat in pace.*

Ted Saad then presented the ten MTT-S Fellows Awards to those who had elected to receive their certificates at the Awards Banquet:

H. Clark Bell: For advancements in synthesis techniques and development of new prototype networks for microwave filters.

Kazuhiko Honjo: For contributions to the development of gallium-arsenide integrated circuits.



1997 AdCom President R. E. "Skip" Bryan presents Ralph Levy his plaque for being the 1997 Microwave Career Awardee.

Asher Madjar: For contributions to large-signal modeling of MESFETs.

Toshio Nishikawa: For contributions to the development of microwave devices for mobile communication systems based on low-loss dielectric ceramics.

Anthony M. Pavio: For developments in broadband active and passive GaAs monolithic mixers, and for contributions to microwave circuit technology.

Roger D. Pollard: For contributions to the development of microwave and millimeter-wave measurements, and active device characterization.

S. Michael Saad: For contributions to the analysis, design and development of waveguide components.

Alwyn J. Seeds: For contributions to the development of microwave photonic devices and systems.

Richard V. Snyder : For

contributions to the development of high power miniature stop-band filters and extremely wide-band bandpass filters for microwave applications.

Cheng Paul Wen: For contributions to the invention and the development of coplanar waveguide based microwave integrated circuit and monolithic microwave integrated circuit techniques.

President Bryan presented the following awards at the IMS Annual Awards Banquet:

1997 Microwave Career Award

Dr. Ralph Levy

The Microwave Career Award is the highest honor bestowed by MTT-S. It recognizes an individual for a lifetime career of meritorious service and technical excellence in the field. Our honored recipient is Dr. Ralph Levy, an internationally

recognized independent consultant for microwave passive components and an IEEE Fellow.

The award consists of a plaque, a certificate, and an honorarium of \$2,000. The Career Award Citation reads: "FOR A CAREER OF INNOVATION IN THE SYNTHESIS OF COMPLEX MICROWAVE PASSIVE COMPONENTS."

Ralph Levy (SM'64, F'73) received his B.A. and M.A. degrees in Physics from Cambridge University England in 1953 and 1957, respectively, and the Ph.D. in Applied Sciences from London University in 1966.

From 1953 to 1959, he was with GEC, Stanmore, where he worked on a variety of systems and waveguide components. In 1959 he joined Mullard Research Laboratories, Redhill, and continued research and development on microwave components and systems. Then from 1964 until 1967 he was a member of the faculty at Leeds University.

He emigrated to the USA in 1967, and was with Microwave Development Laboratories, Natick, Mass. as Vice President of Research until 1984 when he moved to California to join KW Microwave, San Diego, CA., as V.P. Engineering.

After a short period with Remec Inc., he became an independent Consultant in July 1989, and works with several companies on a wide variety of projects, mainly in the field of passive



Ralph Levy presents Skip Bryan with a set of his collected papers.

components.

Dr. Levy is the author of more than 60 papers, 2 books, and 12 patents. He has been involved in many MTT Society activities, including Editor of the *IEEE Transactions on Microwave Theory and Techniques* during 1986-88. He has been Chairman of the Central New England and San Diego MTT Chapters, Technical Program Committee Chairman for the 1983 IMS and Vice-Chairman of the Steering Committee for the 1994 IMS.

His most important technical contributions, evaluated mainly on the basis of being widely referenced, are in chronological order:

1961 - Invention of the Digital IFM System. 1963 - Exact Synthesis of Asymmetric Coupled-Transmission-Line Directional Couplers. 1964 - Explicit formulas for Broadband Matching Networks. 1965 - Synthesis of Distributed Lowpass Filters. 1965 - Generalized Kuroda

Transformations. 1967 - Theory of Direct-Coupled Cavity Filters. 1968 - Synthesis of Branch-Guide Directional Couplers (with L.F. Lind). 1968 - Synthesis of Multi-Aperture Directional Couplers (improved in 1980 with field averaging over the coupling apertures). 1970 - Introduction of Zolotarev Functions with Microwave Circuit Applications. 1970 - Design of Mixed Lump and Distributed Networks. 1973 - Generalized Design of Distributed Ladder Networks. 1973 - Tapered Corrugated Waveguide Lowpass Filters. 1976 - Filters having single extra cross couplings. 1979 - Generalized Multiplexer Theory (with J. D. Rhodes). 1984-88 - Synthesis of Inhomogeneous Distributed Networks. 1994 - Synthesis of Singly Terminated Cross Coupled Filters. 1995 - Direct Synthesis of Cascaded-Quadruplet Filters. 1995 - Simple theory of Dual-Mode Cavity Coupling.

1997 Pioneer Award

Dr. Ali E. Atia & Dr. Albert E. Williams

The Pioneer Award recognizes contributions that have had a major impact on the microwave engineering field and have stood the test of time. The basis of nomination is an archival paper in the field of interest of MTT-S, published at least 20 years prior to the year of the award.

Dr. Ali E. Atia and Dr. Albert E. Williams are the recipients this year of the Pioneer award. They developed the dual-mode cavity filter at COMSAT Laboratories which has been widely used for multiplexers and filters requiring high selectivity in a limited volume.

Each award consists of a plaque and an honorarium of \$1,000. The citations read: "FOR THE INVENTION OF THE DUAL-MODE CAVITY FILTER, A MAJOR ADVANCE IN THE DEVELOPMENT OF SATELLITE COMMUNICATIONS."

In the late 1960's, it was recognized that the most efficient way to design a satellite payload with a large communications capacity was to divide the allocated 500 MHz frequency band into a large number of narrowband transponders, each with its own non-linear power amplifier. In 1968, this could only be achieved with bulky waveguide Chebycheff filters. For example, the INTELLSAT IV payload



1997 AdCom President Skip Bryan presents Dr. Ali Atia with the 1997 Pioneer Award.

contained twelve, 10-pole filters of 36 MHz bandwidth, each weighing approximately 2200 grams. A significant filter weight reduction was needed in order to increase the number of channels in the satellite communications systems without adding extra payload.

Dr. Atia and Dr. Williams solved this problem by developing the dual mode cavity filter in which a single cavity could support two electrical resonant modes and, in addition, could generate responses with sharp selectivity and/or flat group delay. An eight-pole elliptic filter constructed in four physical cavities and weighing only 450 grams proved to be electrically equivalent to the INTELLSAT IV 10-pole Chebycheff filter and was first flown in space on the INTELLSAT IV-A communications satellite.

During the next 25 years, this original work lead directly to the development of many types of

multiple coupled-cavity filters and multiplexers providing significant reduction in mass and volume for high-capacity satellite payloads. In 1991, collaboration with Lincoln Laboratory led to the development of high-temperature superconducting thin films. Both cavity and superconducting filters are now finding extensive application in the wireless industry.

Ali E. Atia (S '67, M '69, SM '78, F '87) received his B.S. Degree from Ain Shams University, Cairo, Egypt, in 1962, M.S. and Ph.D. Degrees in Electrical Engineering from the University of California, Berkeley, in 1966 and 1969, respectively. In 1994, Dr. Atia joined CTA International where he is presently President. CTA International implements turnkey satellite telecommunications and direct broadcast systems, and currently is managing the implementation of the INDOSTAR Program, a direct broadcast satellite system

for the Republic of Indonesia.

Dr. Atia joined COMSAT Laboratories in 1969 where he participated in research and development of a broad range of advanced microwave technologies for communication satellite transponders and antennas. He designed, developed and implemented microwave flight hardware (mixers, filters, multiplexers, amplifiers, switches, antennas, etc.) for several satellite programs covering the L- through the Ka- frequency bands. Dr. Atia participated in and directed system development and software activities for several satellite programs and ground stations projects for customers including INTELSAT, INMARSAT, ARABSAT, and others.

Dr. Atia held several technical and management positions at COMSAT, the most recent of which was Vice President and Chief Engineer for COMSAT Technology Services and COMSAT Systems Division.

Dr. Atia is a Fellow of the IEEE, Associate Fellow of the AIAA, and a member of the Sigma Xi Research Society. He has authored or co-authored over one hundred refereed technical articles and presentations in the IEEE transactions and various national and international conferences and symposia. He holds five patents in the areas of microwave filters and receivers.

Albert E. Williams (S '66, M '66, SM '78, F '87) was born March 27, 1940, in Albany,

Western Australia. He received a B.E. degree from University of Western Australia in 1962; a Ph.D. from University College, London University, in 1966; and an MBA from George Washington University in 1990. From 1966 to 1968, he was a lecturer in the Department of Electrical Engineering at the University of Western Australia. In 1969, Dr. Williams joined COMSAT Laboratories as a Member of the Technical Staff in the Transponders Department of the Microwave Technical Division. He is currently Vice President of the Satellite and Systems Technologies Division.

During his tenure at COMSAT, Dr. Williams has also made major contributions to satellite and ground system design for both the INTELSAT and INMARSAT Systems. In recent years, he has led the COMSAT Laboratories team studying the application of low earth orbit, intermediate circular orbit, and geostationary orbits for personal handheld communications.

Dr. Williams is a Fellow of the IEEE (1986), a past chairman of the MTT-8 subcommittee, and a member of Sigma Xi, the Scientific Research Society. In 1966, he was joint recipient of the IEEE (London) Sylvanus P. Thompson Premium Award, and in 1984 a joint recipient of the COMSAT Research Award. He has authored/co-authored more than 50 papers and holds seven patents.



1997 AdCom President Skip Bryan presents Dr. Albert Williams with the 1997 Pioneer Award.

1997 Distinguished Educator Award

Dr. David B. Rutledge

This Award was inspired by the untimely death of Professor F. J. Rosenbaum (1937-1992), an outstanding teacher of microwave science and a dedicated MTT-S AdCom member/contributor. The award is given to a distinguished educator in the field of microwave engineering and science who exemplifies the special human qualities of the late Fred J. Rosenbaum. Fred considered teaching a high calling and demonstrated his dedication to MTT-S through tireless service.

The award consists of a plaque and an honorarium of \$1,000. The awardee must be a distinguished educator, recognized, in general, by an academic career coupled to many years of service to the microwave profession. The effectiveness of the educator

should be supported by a list of graduates in the field of microwave science who have become recognized in the field. The candidate shall also have an outstanding record of research contributions documented in archival publications. The candidate shall also have a record of many years of service to MTT-S.

The honored recipient of this year's award is Dr. David B. Rutledge, Professor of Electrical Engineering at the California Institute of Technology. The citation reads: "FOR LEADERSHIP IN TEACHING, RESEARCH AND IN THE MICROWAVE PROFESSION."

David B. Rutledge (M'75, S'77, M'77, S'78, M'80, SM'89, F'93) grew up in Fort Worth, Texas. He attended Williams College, in Williamstown, Massachusetts, receiving a B.A. in Mathematics in 1973, and Cambridge University, Cambridge, England, receiving an M.A. in



1997 AdCom President Skip Bryan presents Dr. David B. Rutledge with the 1997 Distinguished Educator Awards.

Electrical Sciences in 1975. He worked as an Aerosystems Engineer on microwave data links for General Dynamics (now Lockheed-Martin) in Fort Worth, Texas in 1975 and 1976. He received his Ph.D. in Electrical Engineering in 1980 from the University of California, Berkeley. His advisor was Professor Steven Schwarz, and the thesis topic was *Submillimeter-Wave Integrated-Circuit Antennas and Detectors*.

Since 1980, he has been teaching at Caltech and working on microwave circuits and antennas. His research group developed key ideas in integrated-circuit antennas, including lens-coupled antennas, which appear widely in radio-astronomy receivers. His group demonstrated anisotropic etching for fabricating horns and membrane technology for suspending metal antennas. The group first described leakage from

planar transmission lines, and first demonstrated many active quasi-optical components, including phase shifters, oscillators, mixers and amplifiers. Recently the group has developed Class-E HF power amplifiers for industrial and amateur use. He is co-author with Scott Wedge and Richard Compton of the widely distributed educational microwave computer-aided design package, *Puff*, with 15,000 copies worldwide.

He was a visiting scientist at CSIRO, New South Wales, Australia, in the summer of 1985, at the Research Institute for Electrical Communication, Tohoku University, Sendai, Japan, in the spring and summer of 1988, and at the National Defense Academy, Yokosuka, Japan in the fall of 1995. He has been a Distinguished Lecturer for the Antennas and Propagation Society from 1991 to 1993 and is a member of the AP-S AdCom. He was honored with the Teaching

Award of the Associated Students of Caltech, and five of his students have been awarded Presidential Investigator and Career Awards.

He has served as Chairman for nineteen doctoral candidates and has authored or co-authored over 200 publications. He is an IEEE Fellow and was one of the recipients of the MTT-S Microwave Prize in 1993.

1997 Microwave Prize

The Microwave Prize is awarded annually to the author or authors of a paper published in the IEEE Transactions on Microwave Theory and Techniques, or any other IEEE publication, that is judged to be the most significant contribution in the field of interest to the Society in the calendar year preceding that in which the selection is made.

The 1997 Microwave Prize is awarded to Ruai Y. Yu, Madhukar Reddy, Joe Puzl, Scott T. Allen, Michael Case, and Mark J. W. Rodwell for their paper entitled "Millimeter-Wave On-Wafer Waveform and Networks Measurements Using Active Probes," *IEEE Transactions on Microwave Theory and Techniques*, vol. 43, no. 4, April 1995, pp. 721-729.

Ruai Y. Yu received the B.S. degree in Electrical Engineering from San Francisco State University in 1988, the M.S. and Ph.D. degrees, both in Electrical Engineering, from the University of California at Santa

Barbara in 1991 and 1994, respectively.

From 1988 to 1989 he was a research engineer at Ampex Corporation where he was engaged in the research and development of advanced equalization schemes for high-speed digital recording channels. A complete hardware and software development of an adaptive equalizer using transversal filters was successfully demonstrated. While he was a graduate student at UCSB, he developed novel high-speed integrated circuits and built systems for microwave and millimeter-wave instrumentation. He implemented on-wafer probe systems which are capable of performing waveform and network measurements up to 200 GHz. He demonstrated the world's first monolithic traveling-wave resonant tunneling diode (RTD) pulse generator and was involved in development of a novel biasing scheme for RTD oscillators.

Dr. Yu joined the High-Speed

Circuits Department, Rockwell Science Center, as a member of technical staff in February, 1994, where he is now a senior scientist. His current research interests include the design and packaging of high-speed, high-resolution analog-to-digital converters, broadband integrated circuits for 40 Gbit/s optical transmission systems, and RF/microwave transceiver circuits for wireless communication applications. He has implemented numerous packaged high-speed/low-noise analog/RF integrated circuits using submicron CMOS, and advanced Si BJT, and Al-GaAs/GaAs HBT technologies. Dr. Yu has authored and co-authored over 50 publications in the areas of high-speed integrated circuits and systems.

Madhukar Reddy (S '84, M '85) was born in Hyderabad, India on November 4, 1969. He received the B. Tech degree in Electronics and Communication Engineering from the Indian

Institute Technology, Madras, India in June 1991. Since September, 1991, he has been a graduate student at the University of California, Santa Barbara, working in the area of high speed electronic devices and circuits and under the guidance of Professor Mark Rodwell from July 1991. He received the M.S. degree in Electrical Engineering in March 1993 and the Ph.D. in Electrical Engineering in December 1996. For his Ph.D. thesis, he developed monolithic Schottky collector resonant tunnel diode oscillator arrays for generating power at submillimeter-wave frequencies. During the summer of 1996, he worked as a summer intern at Rockwell Semiconductor Systems, Newport Beach, CA. Dr. Reddy is presently at Rockwell Semiconductor Systems, Newport Beach and is involved in the development of RF circuits for wireless applications.

Joseph A. Pusi was born in San Diego, CA., on September 19, 1968. He received the B.S. degree in 1990 and the M.S. degree in 1992 in Electrical Engineering, both from the University of California, Santa Barbara. His graduate emphasis was on microwave circuit design and solid state device physics and modeling.

While pursuing the M.S. degree, his research was concentrated on millimeter-wave network analysis technologies and broadband millimeter-wave MMIC designs. For mm-wave network analysis, he worked on the characterization and optimization of



coplanar transmission lines for broadband applications to 200 GHz. His work on broadband (dc-100 GHz) MMICs was done in collaboration with Hughes Research Laboratories, Malibu, CA. This involved the development of active device models for InP-based HEMTs valid up to mm-wave frequencies, the determination of circuit topologies suitable for the application, and the design of low-parasitic, high-bandwidth coplanar structures.

Since July, 1992 he has been with Hughes Space and Communications Company, Los Angeles, CA. He is involved with three-terminal device development, large signal characterization, large signal modeling, MIC and MMIC design, packaging, and semiconductor reliability testing. He has developed an active harmonic loadpull system with waveform sampling capability for the large signal characterization of active devices in the frequency and time domains. He is currently working on a collaborative effort with Hughes Research Laboratories to develop a GaAs-based power pHEMT process suitable for high-efficiency applications from 1 to 20 GHz.

Scott T. Allen received his Bachelor of Science degree in 1987 from Cornell University and in 1989 received an M.S. degree from the University of Massachusetts, Amherst, where he specialized in microwave technology. In 1994 he received his

Ph.D. in Electrical Engineering from the University of California at Santa Barbara, where his research focused on GaAs devices and circuits for sub-millimeter-wave applications. For his thesis project he developed a nonlinear-transmission-line-based sampling circuit that had a 3 dB bandwidth of 725 GHz.

Prior to returning to school to earn his Ph.D., Dr. Allen spent three years at Lockheed Martin's Electronics Laboratory working as a Device Engineer on the development of HEMT technology. His work there included extensive device modeling of both GaAs pHEMTs and InP HEMTs and the design of low noise MMIC amplifiers.

In 1994 he joined the research and development group at Cree Research in Durham, NC, to work on silicon carbide MESFETs for microwave power applications. Since that time he has become the principal investigator on a S-band power MESFET program and a MAFET Thrust 3 X-band power MESFET program. He also recently demonstrated the first GaN/AlGaIn HEMT fabricated on a silicon carbide substrate.

Dr. Allen has authored or co-authored over 40 papers published in various conference proceedings and refereed journals. He has also been cited as a co-inventor on three patent applications pertaining to silicon carbide microwave technology.

Michael Case (S '88, M '91, S

'91, M '93) was born in Ventura, California in 1966. He attended the University of California at Santa Barbara from 1984 to 1993, earning his B.S. in 1989, M.S. in 1991, and his Ph.D. in 1993. His graduate work involved ultra high speed waveform generation and measurement. The focus of this work was nonlinear transmission lines to generate picosecond electrical transitions.

Michael is currently employed at the Hughes Research Labs in Malibu, California where he is involved with GaAs-, InP- and SiGe-based device characterization and circuit design. Applications range in frequency from L-band to W-band and encompass satellite, ground terminal, RADAR, and automotive systems. Michael has authored 35 technical papers and five patent applications.

Mark J. W. Rodwell (M '89) was born in Altrincham, Cheshire, England in 1960. He received the B.S. degree in Electrical Engineering from the University of Tennessee, Knoxville, in 1980, and the M.S. (1982) and Ph.D. degrees (1988) in Electrical Engineering from Stanford University. From 1982 through 1984 he worked at AT&T Bell Laboratories, developing optical transmission systems. He was a research associate at Stanford University from January to September 1988.

In September 1988 he joined the Department of Electrical and Computer Engineering, at the

University of California, Santa Barbara, where he is currently Professor. His current research involves submicron scaling of millimeter-wave heterojunction bipolar transistors (HBTs) and development of HBT integrated circuits for microwave receivers and fiber optic transmission systems. His group has developed deep submicron Schottky-collector resonant-tunnel diodes with THz bandwidths, and has developed monolithic submillimeter-wave oscillators with these devices. His group has worked extensively in the area of GaAs Schottky-diode integrated circuits for subpicosecond pulse generation, signal sampling at submillimeter-wave bandwidths, and millimeter-wave instrumentation. He is the recipient of a 1989 National Science Foundation Presidential Young Investigator award, and his work on submillimeter-wave diode ICs has been recognized by an invited paper in the *Proceedings of the IEEE*.

1997 Distinguished Service Award

Mr. Vladimir G. Gelnovatch

The Distinguished Service Award is presented to honor an individual who has given outstanding service over a period of years for the benefit and advancement of MTT-S.

This year's honoree is Mr. Vladimir G. Gelnovatch, Acting Director of the Physical Sciences Directorate of the U. S. Army

Research Laboratory. He served as President of MTT-S AdCom in 1989. He is an IEEE Fellow.

His Citation reads: "FOR 36 YEARS OF DILIGENT, EXCEPTIONALLY EFFECTIVE AND DISTINGUISHED SERVICE TO THE MICROWAVE THEORY AND TECHNIQUES SOCIETY AND THE MICROWAVE PROFESSION".

Vladimir G. (Walt) Gelnovatch (S'61, M'64, SM'69, F'82) is currently Acting Director of the Physical Sciences Directorate of the Army Research Laboratory. He was appointed to the position on February 3, 1995.

Prior to his appointment, Mr. Gelnovatch served as the Director of the Microwave/Lightwave Component Division, EPSD, for the past 18 years. He has additionally served as the Army Project Manager of the ARPA sponsored MIMIC and MAFET programs. He began his government career at Fort Monmouth in the Signal Corps Engineering

Laboratory (SCEL).

Gelnovatch has made many significant contributions to the area of microwave/millimeter-wave components and circuits, and has authored or co-authored over 40 reports and publications. He pioneered the use of optimal seeking CAD to design microwave circuits, authoring a program called DEMON, for which he received the 1972 Army Research and Development Award. He is known for his development of microwave integrated circuits (MICs) and monolithic MICs (MMICs).

His professional affiliations include membership in the Institute of Electrical and Electronic Engineering (IEEE). He was elected a Fellow of the Institute in 1982 and served as the president of the IEEE Microwave Theory and Techniques Society in 1989. He is currently a member of the Electrical Engineering Department Industrial Advisory Board at the University of Virginia, serving since 1985, and is



a Visiting Professor of Electrical Engineering there. He currently serves as an associate editor of the Microwave Journal. He was awarded the Army Meritorious Civilian Service Award in 1990. In 1974, he visited Russia on an IEEE exchange program, visiting many unclassified institutes.

He is currently the Army's Principal Member of the JDL/Defense Reliance Technology Panel for Electron Devices, and the Army member of the DoD Advisory Group on Electron Devices, serving since 1965.

Vladimir G. (Walt) Gelnovatch received a B.S. degree in Electronic Engineering from Monmouth College, West Long Branch, New Jersey in 1963, and his M.S. degree in Electrical Engineering from New York University, in 1967, including post M.S.E.E. degree work there.

Walt was born in New York City in 1938. He served in the Signal Corps in Germany from 1956 to 1959, as the Site Chief of the Holenstadt Microwave Radio Station. He resides in Manasquan, New Jersey with his wife, Dorit. They have three sons and two grandchildren.

1997 N. Walter Cox Award

Dr. Reynold S. Kagiwada

The N. Walter Cox award has been established in recognition of the qualities of N. Walter Cox and his service to the MTT Society prior to his untimely death in 1988. It is given aperiodically to a

Society Volunteer whose efforts on behalf of MTT-S best exemplify his spirit and dedication.

This year's recipient is Dr. Reynold S. Kagiwada. The citation reads: "FOR EXEMPLARY SERVICE, GIVEN IN A SPIRIT OF SELFLESS DEDICATION AND COOPERATION."

Reynold S. Kagiwada (M '72, SM '79, F '89) is the Advanced Technology Manager for Microwave Technology at TRW in Redondo Beach, California. He received his B.S., M.S., and Ph.D. from the University of California at Los Angeles in 1960, 1962, and 1966 respectively. Dr. Kagiwada is responsible for coordinating internal and external technology development activities and new business for RF Products and Advanced Microelectronics. Previously, he was the Assistant Program Manager with responsibility for the fabrication, testing, assembly, and packaging of the MMIC chips on the DARPA MIMIC

Program at TRW. Prior to joining TRW in 1972, he was Assistant Professor at the University of Southern California from 1969 to 1972, and Assistant Professor in Residence at the University of California at Los Angeles from 1966 to 1969.

Dr. Kagiwada has served the MTT-S Society in a number of key positions in the microwave symposia and AdCom. He was Editor of the *MTT-S Newsletter* from 1984 to 1987, and chaired a number of AdCom committees dealing with education, budget, and long-range planning before his election as Vice-President in 1991 and MTT-S President in 1992.

Dr. Kagiwada has also been very active in the MTT-S International Microwave Symposia over the years. He served as Technical Program Chairman in 1987 and 1989, and Finance Chairman in 1994. He has served on the Steering Committee of the Microwave and Millimeter-Wave Monolithic Circuits




Reynold Kagiwada receives the Walter Cox Award from 1997 AdCom President Skip Bryan.



Reynold receives congratulations from Di Sun.

Symposium as Local Arrangements Chairman in 1984, Vice-Chairman in 1986, Finance Chairman in 1987, Technical

Program Chairman in 1988, and Chairman in 1989. Within the IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society, he served on their AdCom as Secretary/Treasurer from 1982 to 1988, Publication Chairman in 1979, and Technical Program Chairman in 1983 of the IEEE International Ultrasonics Symposium.

Dr. Kagiwada holds eight patents, and is co-author of 45 technical papers. He was a Gold Medal Recipient for the 1985 TRW Ramp Technology Transfer Award and received the ESG Chairman's Award for Innovation in 1991. He is a member of Old Crows, Sigma Pi Sigma, and Sigma Xi. Dr. Kagiwada is an IEEE Fellow. 

self-study course is a learning package designed for engineers in telecommunications, computer, power, consumer electronics, medical equipment and automotive industries. Circuit and system designers, test & evaluation engineers, and specification professionals. The course is devised to expose these individuals to an abundance of information on EMC and EMI.

Among many objectives, the course will teach the following:

- the approaches to model and understand the sources of EMI;
- techniques of measuring EMI;
- procedures for measuring immunity to pulsed interferences;
- and useful engineering practices and technology tools to minimize EMI and improve EMC.

In addition, learners will become familiar with a variety of military and non-military standards used in specifying limits for electromagnetic interference and electromagnetic compatibility.

The EMC/EMI course comprises of 14 lessons, each specifying learning objectives, reading assignments with answers, and discussion topics. Lesson 14, written by Andrew Drozd, discusses EMC Computer Modeling and Simulation. A self-testing quiz follows each lesson. Among the topics featured in the lessons are:

Announcing A New Self-Study Course From Educational Activities

Learn To Eliminate EMI with EMC Self-Study Course

PISCATAWAY, NJ, September 1, 1997 — A new self-study course on Electromagnetic Compatibility (EMC)/Electromagnetic Interference (EMI) is now available from The Educational Activities Board of The Institute of Electrical and Electronics Engineers.

This continuing education

course, authored by Dr. V. Prasad Kodali, consists of three parts: a study guide, a textbook — Engineering Electromagnetic Compatibility: Principles, Measurements and Technologies, and a reader — EMC/EMI: Selected Readings.

In the age of far-reaching information technology, electromagnetic compatibility is a relevant and an important issue in many areas of electro-technology. The EMC/EMI

- Natural and Nuclear Sources of EMI;
- EMI from Apparatus and Circuits;
- Probabilistic And Statistical Physical Models;
- Radiated and Conducted Interference Measurements;
- Pulse Interference Immunity;
- Grounding, Shielding, and Bonding;
- EMI Filters;
- Cables, Connectors and Components;
- Frequency Assignment and Spectrum Conservation;
- and EMC Standards.

A final examination follows the course. Those who successfully complete the course, will be awarded 8CEUÆs and the IEEE Certificate of Achievement.

Dr. V. Prasad Kodali received his Ph.D in 1967 from University of Leeds in England. He is an adviser in the Department of Electronics of the Government of India. Dr. Kodali is also an IEEE Fellow. Mr. Andrew Drozd is the president and chief consultant for Andro Consulting Services providing research, development and consultation in electromagnetics technology and related engineering disciplines.

To order, use product number HL579. Member price, \$279. List price, \$349. The package may be ordered from the IEEE, 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855-1331.

Make checks payable to IEEE. For single sales, call 1-800-678-IEEE; for company or institutional sales, call 1-800-701-IEEE; or fax 732-981-9667.

Please add the following shipping and handling charges: for orders totaling \$1.00 to \$50.00, add \$4.00; \$50.01 to \$75.00, add \$5.00; \$75.01 to \$100.00, add \$6.00; \$100.01 to \$200.00, add \$8.00; over \$200.00, add \$15.00. Call for overseas Air Freight charges. Credit card orders (MasterCard, Visa, American Express, and DinerÆs Club) are accepted.

Produce Clean Software Designs, Take An Object-Oriented Analysis Challenge

PISCATAWAY, NJ, August 10, 1997 — The process of developing software is extremely creative and potentially satisfying, but often fraught with pitfalls, delays, and bugs resulting in frustration. A new self-study course on analyzing and designing object-oriented (OO) systems from The Educational Activities Board of The Institute of Electrical and Electronics Engineers can help reduce the level of frustration and software programming flaws.

This continuing education course, authored by Dr. Eric J. Braude of Boston University, consists of a textbook — Object Oriented Modeling and Design,

(Rumbaugh et. al, Prentice Hall) — a study guide, a workbook and a final exam. Those who receive a passing grade on the final exam, will be awarded eight Continuing Education Units (CEU's) and an IEEE Certificate of Achievement.

Augmenting and explaining the OMT methodology of Rumbaugh, et. al, this course incorporates useful elements of the Unified Modeling Language, Design Patterns, and the Booch, Jacobson, Coad/Yourdon and Shlaer/Mellor methodologies. Included into contents are:

- class selection,
- class relationship,
- attribute and operation selection,
- dynamic and function models,
- system design,
- and object design.

Performing object-oriented analysis before programming makes the software-development process more grounded, more professional and more orderly. Dr. Braude aimed this course to provide a practical roadmap for designing object-oriented applications. His goal is to prepare the software engineer to develop OO systems and code with a clarity and minimum of rework. Also provided is a clear sequence of steps for the design of OO applications. Although the text includes fragments of C++ and Java, knowledge of them is not required. This

course will guide the users through the analysis, system design and object design phases of system building.

Among the many objectives, this course will teach the following:


- the key reasons for using OO methods,
- the three parts of the OMT development process,
- and the selection of good class candidates.

Every unit of this highly applied course has self-testing questions

and problems as well as hands-on exercises to ensure better understanding and usefulness. When completed, the course package can also serve as a valuable reference.

To order, use product number HL5733. Member price, \$249. List price, \$299. The package may be ordered from the IEEE, 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855-1331. Make checks payable to IEEE. For single sales, call 1-800-678-IEEE; for company

or institutional sales, call 1-800-701-IEEE; or fax 732-981-9667.

Please add the following shipping and handling charges: for orders totaling \$1.00 to \$50.00, add \$4.00; \$50.01 to \$75.00, add \$5.00; \$75.01 to \$100.00, add \$6.00; \$100.01 to \$200.00, add \$8.00; over \$200.00, add \$15.00. Call for overseas Air Freight charges. Credit card orders (MasterCard, Visa, American Express, and Diner's Club) are accepted. 

Conference Report

**The Automatic Radio Frequency Techniques Group Conference on
"Characterization of Broadband Telecommunications
Components and Systems"
Denver, CO June 13, 1997**

Report prepared by:

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Abstract:

This conference report reviews the 49th Automatic Radio Frequency Techniques Group Conference, whose theme was "Characterization of Broadband Telecommunications Components and Systems." The report emphasizes the contributions of the conference to technology for broadband telecommunications.

This report was prepared for the Journal of Research of the National Institute of Standards and Technology

1. Introduction

While most of the booming

consumer and industry demand for data transport is for data into the home or office, the "return-path" or "upstream" data requirements are growing rapidly in markets such as telecommuting and video conferences. To satisfy the demand, the major telecommunications players are rushing to establish high bandwidth, two-way digital networks for video, telephony, and Internet to homes and businesses.

One major technology expected to play a key role as a future broadband telecommunications system is two-way digital transmissions over coaxial cable. An advantage of such systems is that

much of the infrastructure is currently in place for analog cable television systems. The major upcoming competitors to coaxial systems are based on wireless transmissions. What these have in common is radio frequency (RF) technology. Successful deployment relies on RF components and subsystems of exceptionally high performance.

The Automatic Radio Frequency Techniques Group (ARFTG) annually sponsors two conferences on critical topics in RF technology, with a focus on measurement issues. For its 49th Conference, held in Denver, CO on June 13, 1997, ARFTG chose the theme "Characterization of Broadband Telecommunications Components and Systems" to address the critical RF technology issues of broadband communications, needs that have not been directly addressed by other microwave or radio frequency symposia. The conference, which was cosponsored by the Microwave Theory and Techniques (MTT) Society of the Institute of Electrical and Electronics Engineers (IEEE), featured 18 technical talks, 11 poster presentations, and a product exhibition. It proved to be popular, as the registration level of 205 broke the ARFTG record of 168. Attendees came at least 18 nations: Australia, Belgium, China, Finland, France, Germany, Italy, Japan, Korea, the Netherlands, Norway, Canada, Poland, Singapore, Sweden, Taiwan, the United Kingdom, the United States. Dr. Roger Marks of NIST was the Conference Chair.

2. Oral Sessions

The Technical Sessions, under the direction of Conference Technical Program Chair Dr. Gary Alley of Lucent Technologies, included 18 talks and 11 poster presentations. The oral sessions were presented in the traditional ARFTG single-track format. The morning talks focused on coaxial systems and the afternoon on wireless.

2.1 Broadband Coaxial Systems

Over the past 7 years, community antenna television (CATV, or cable television) systems have been evolving from one-way transmission of NTSC (U.S. Standard) video signals using long cascades of coaxial amplifiers and directional couplers into bidirectional transmission of NTSC video and digital signals on Hybrid Fiber-Coaxial (HFC) distribution systems. The use of linear light-wave transmitters and receivers has resulted in improved performance for NTSC video transmission but has increased the degradation in digital performance due to laser clipping caused by peaks produced by the broadband multichannel NTSC video waveform. HFC systems being deployed today typically transmit signals from the headend to the home in the 50 MHz to 750 MHz portion of the spectrum while transmitting digital signals from the home to the headend in the 5 MHz to 40 MHz band. The downstream

band from 50 MHz to 550 MHz is generally used for up to 83 NTSC video channels while the spectrum from 550 MHz to 750 MHz is reserved for a mixture of digital services including telephony, video telephony, compressed digital video, and Internet access. It has been known for many years that the performance of the upstream portion of these systems, at 5 MHz to 40 MHz, was limited by ingress into the coaxial portion of the system. The sources of this ingress include impulse noise due to lightning and power line currents, intermodulation noise due to the downstream signals in the 50 MHz to 750 MHz band, and coupling of RF broadcast signals into the cable system. The effect of these interfering signals on upstream digital transmission is the subject of current research.

The conference talks on broadband coaxial systems were:

- RF Measurements for Broadband Networks, S. Fluck (Hewlett-Packard Co., Santa Rosa, CA)

The morning sessions led off with an invited keynote address by Syd Fluck of Hewlett-Packard. Syd discussed the evolution of CATV systems from the 1960s through the present. The introduction of digital transmission on cable systems resulted in the need to characterize the digital performance of these systems in their commercial environment.

Current test sets and methods required to accomplish this task were discussed.

- Proofing and Maintaining Upstream Cable Plant with Digital Signal Analysis Techniques, T. H. Williams (Holtzman Engineering, Longmont, CO)

Tom Williams discussed the test and maintenance needs of the reverse plant, as well as a set of non-traditional burst-mode tests. These tests used a high speed analog-to digital converter to capture test and data signals which were then analyzed using a personal computer located at the headend. Examples of data collected and analyzed using these techniques were presented.

- Procedure for Measurement and Characterization of Upstream Channel Noise in CATV Networks, K. Haelvoet, D. De Bal, K. De Kesel, B. Vanlandschoot, and L. Martens (University of Gent, Belgium)

This paper presented methods for characterizing both ingress and impulse noise in the upstream portion of the system. These methods were independent of the modulation and access techniques used in the systems. Examples were presented using data collected in the field.

- Performance of QAM on a Hybrid Fiber-Coax CATV System, C. Bianchi (Sanders Associates), G. Lentz (Lucent Technologies), and R. Welter (CableVision NY)

Chuck Bianchi discussed the

digital system performance of an operational HFC CATV system using measured data from both upstream and downstream 4 and 64 Quadrature Amplitude Modulation (QAM) modems. The resulting performance is found to vary with respect to time, to signal amplitude, and to direction of transmission. In the forward path, the effect of background impairments varies with time and signal power. In the return path, the effect of interferer-like impairments limits the system performance. Statistical bit-error-rate (BER) data were presented along with BER and signal-to-noise (S/N) data which show the variation in system performance with time.

- Alignment and Maintenance Issues for Upstream Cable Plant, W. Morgan (Hewlett Packard Co., Santa Rosa, CA)

Bill Morgan presented a paper which summarized the issues involved with the initial return path alignment and suggestions for the continued maintenance of the return path.

- Characterization of Cable Amplifiers for Broadband Network Applications, J. Steel, A. Parker, and D. Skellern (Macquarie University, Australia)

Jodi Steel presented a paper which discussed the need for characterization of cable network elements for use in digital cable networks. The paper focused on the characterization of nonlinear, frequency-dependent network

elements by using a combination of filter blocks and nonlinear blocks. The 2nd and 3rd order distortion performance of CATV amplifiers was presented as an example of the technique.

- Optimal Control of Intermodulation Distortion in Hybrid Fiber Coaxial CATV Systems, G. D. Alley and Y. L. Kuo (Lucent Technologies, N. Andover, MA)

Gary Alley discussed a technique for minimizing the peak-to-RMS values of the broadband multi-channel NTSC video waveform while minimizing both the 2nd and 3rd order distortion products. This was accomplished by optimally controlling the phases of the NTSC video carriers. Both theoretical and experimental results were presented.

This paper was selected to receive the conference's Best Paper Award.

- CATV Tap and Splitter Linearity Improvement for Broadband Information Networks, M. W. Goodwin (Lucent Technologies, N. Andover, MA)

Mike Goodwin presented an analysis of the source of the intermodulation distortion in HFC CATV systems produced by CATV taps and splitter/combiners, as well as a method for improving the linearity of these devices.

2.2 Broadband Wireless Systems

Broadband wireless access is emerging as an alternative

method of providing a high capacity digital channel to and from the home. Multichannel Multipoint Distribution Systems (MMDS, or "wireless cable") have existed for some time, offering up to 33 analog video channels in the 2.150 GHz-2.682 GHz band. The current direction with MMDS is the introduction of compressed digital video in an effort to increase the capacity of these systems and make them more competitive with cable and satellite video distribution systems. The FCC's allocation of over 1 GHz of bandwidth between 27.5 GHz and 31.3 GHz has stimulated interest in Local Multipoint Distribution Systems (LMDS). The bandwidth available is expected to provide high capacity two way wireless services to the home. Wireless systems are physically easier to deploy than wired systems but still present significant challenges to the system provider. Issues such as co-channel adjacent-cell interference and multipath propagation with the resulting finite coherence bandwidth must be addressed.

- LMDS System Design and Performance, W. McKissock and B. Bossard (CellularVision USA, New York, NY)

The afternoon sessions began with a talk by the originator of LMDS, Bernard Bossard. Mr. Bossard discussed the status and design considerations of his company's LMDS system.

- 28 GHz LMDS System Deployment Considerations, M. S. Shakouri (Hewlett Packard, Cupertino, CA)

Mohammad Shakouri described a system architecture which would provide broadband two-way LMDS service to the home.

- 64 QAM MMDS with Digital Video Compression, M. Frankel (Decathlon Communications, Inc., Englewood, CO)

Martin Frankel described a proposed implementation of 64 QAM compressed digital video on a 2 GHz MMDS system.

- Conversion Gain Measurement of an LMDS Transmitter, L. R. Hoover and K. W. Burkhart (Texas Instruments, Inc., Dallas, TX)

Lowell Hoover presented a real-time conversion gain measurement technique for an LMDS transmitter utilizing swept scalar analysis and compared the results with a traditional discrete point method.

- Characterization of Miniature Millimeter-Wave Vivaldi Antenna for Local Multipoint Distribution Service, R. N. Simons and R. Q. Lee (NASA Lewis Research Center, Cleveland, OH)

Rainee Simons presented an efficient measurement technique to characterize the input impedance and directional gain of a Vivaldi antenna together with a simple technique to impedance match the antenna to a 50 ohm termination.

- Low Phase Noise Gunn Diode MIC VCOs for Application in Digital Radios, E. M.

Godshalk (Redpoint Microwave, Newburg, OR) and V. K. Tripathi (Oregon State University, Corvallis, OR)

Ed Godshalk presented design information together with measured data for a low phase noise 18 GHz Gunn diode voltage-controlled oscillator.

- Characterizing Components under Large Signal Excitation: Defining Sensible "Large Signal S Parameters"?! J. Verspecht, M. Vanden Bossche, and F. Verbeyst (Hewlett-Packard Network Measurement and Description Group, Brussels, Belgium)

Jan Verspecht presented a black-box measurement technique which characterizes the nonlinear performance of microwave components under periodic large-signal excitation. This technique is based on a vectorial nonlinear-network analyzer, which accurately measures the phase and amplitude of all spectral components of both incident and reflected traveling waves.

- Transition Analyzer-Based Harmonic and Waveform Load Pull Measurements, J. W. Bao, M. Shirokov, C. J. Wei, and J. C. M. Hwang (Lehigh University, Bethlehem, PA)

J.W. Bao presented a new load-pull measurement technique based on a microwave transition analyzer. This technique uses in-situ calibration and large-signal verification to improve measurement accuracy.

- Automated Measurement Procedures of Three-Port and Four-Port Devices on Silicon Wafers, F. R_rat, J. L. Carbonro, G. Morin (SGS Thompson Microelectronics, Crolles, France), and B. Carbon (LEMO/ENSERG /INPG, Grenoble, France)
- Determination of Bias Dependent Source Resistances in GaAs MESFETs under Cold-FET Conditions, C.-H. Kim, K. S. Yoon, M.-G. Kim, J.-W. Yang, J.-J. Lee, and K.-E. Pyun (Electronics and Telecommunications Research Institute, Taejeon, Korea)
- Verification of the Noise Parameter Instrumentation, V. Adamian (ATN Microwave, Inc., N. Billerica, MA)

Fabienne R_rat described a new method which allows RF measurement and characterization of three and four-port RF integrated circuits on silicon wafers.

- Performance Optimization of Ka-Band MMIC Power Amplifier Using On-Wafer Pulsed Power Test, D. C. Yang, J. M. Yang, P. Nussenbaumer, and M. D.

Biedenbender (TRW Inc. RF Product Center, Redondo Beach, CA) Daniel Yang presented a novel technique which has been developed to optimize power monolithic microwave integrated circuit (MMIC) performance by using on-wafer pulsed power tests. The tests are used to determine the functionality of the device and allows the MMIC chip performance to be optimized through manual bias tuning at the module level.

3. Interactive Forum

The Conference included 11 poster papers in an Interactive Forum. While these papers addressed significant problems in ARFTG's traditional field of microwave measurements, most did not directly address the primary conference theme. These papers were:

- Multiport Network Analyzer Self-Calibration: a New Approach and Some Interesting Results, G. Madonna, A. Ferrero, and U. Pisani (Politecnico di Torino, Italy)
- 60 GHz On-Wafer Noise Parameter Measurements Using Cold-Source Method, M. Lahdes, M. Sipal, and J. Tuovinen (Millimetre Wave Laboratory of Finland, Espoo, Finland)
- A Programmable Load for Noise Characterization, L. Klapproth, M. Tempel, and G. Boeck (Technical University of Berlin, Germany)
- Improved Measurement Procedure for Extremely Low Noise Figures of FETs in the Frequency Range below 3 GHz, P. Heymann, R. Doerner, and H. Prinzler (Ferdinand Braun-Institute für Hochfrequenztechnik, Berlin, Germany)
- The Multi-State Radiometer: A Novel Means for Broadband Noise and Small Signal Characterization of Microwave Semiconductor Devices, W. Wiatr and M. Schmidt-Szalowski (Warsaw University of Technology, Poland)
- Accurate Package Modeling based on S-Parameter Measurements, F. Lin, M. Iyer, H. Ma, K.S. Tan (Institute of Microelectronics, Singapore) and M. Kasashima, J. Shibata, and H. Nakamura (OKI Electric Industry Co, Tokyo, Japan)
- Non-Invasive Dual-Probe Time Domain Measurements of Incident and Reflected Waves on High-Speed Digital Chip Interconnects, A. Barel, Y. Rolain, and A. Cumps (Vrije Universiteit Brussel, Belgium)
- Microwave On-Wafer Measurements with Active Needle Probe Tips, H. Heuermann (Rosenberger Hochfrequenztechnik, Tittmoning, Germany)
- Automatic Testing of a 28 GHz LMDS Downconverter, J. D. King and J. T. McKenna (M/A-COM Inc., Lowell, MA)

4. Joint Session on Crosstalk

On Thursday, June 12, ARFTG cosponsored a session of the 1997 IEEE MTT-S International Microwave Symposium. The session, entitled "Crosstalk, Coupling, and Multiconductor Transmission Line Characterization," was organized and chaired by Dr. Dylan

F. Williams of NIST and co-chaired by Dr. Joy Laskar of the Georgia Institute of Technology. This session provided a forum for the latest developments in the theory and measurement of crosstalk and coupling. The session began by focusing on measurements for the characterization of lossy coupled multiconductor transmission lines. It also featured theoretical treatments of multiconductor lines, coupling between devices, and stimulation of multimode systems. The agenda was:

- An Accurate Determination of the Characteristic Impedance Matrix of Symmetrical Coupled Lines on Chips Based on High Frequency S-Parameter Measurements, T. M. Winkel (IBM Deutschland Ent. GmbH, Boeblingen, Germany), L. Dutta (Siemens, Munich, Germany), and H. Grabinski (LFI, University of Hannover, Germany)
- Embedded Multiconductor Transmission Line Characterization, D. F. Williams (NIST, Boulder, CO)
- Characterization of Multiconductor Coupled Lines from Multiport TDR Measurements, A. Tripathi and V. K. Tripathi (Oregon State University, Corvallis, OR)
- Experimental Circuit Model Generation of Non-Uniform Coupled Multi-Conductor Structures, S. Sercu and L. Martens (University of Gent, Belgium)

- Waveform Relaxation Synthesis of Time-Domain Characteristic Model of Coupled Transmission Lines from FDTD Simulation, Q.-X. Chu, F.-Y. Chang (Chinese Univ. of Hong Kong)
- Excitation of the Parasitic Parallel-Plate Line Mode at Coplanar Discontinuities, K. Beilenhoff (TH Darmstadt, Germany) and W. Heinrich (Ferdinand-Braun-Institut, Berlin, Germany)
- Investigation of MMIC Inductor Coupling Effects, M. Werthen, I. Wolff (IMST, Kamp Lintfort, Germany), R. Keller, and W. Bischof (Bosch Telekom GmbH, Backnang, Germany)

5. Summary

Broadband telecommunications systems are undergoing rapid development and will soon begin to make a significant thrust into consumer and industry markets. Advances in radio frequency technology are critical to the cost and timing of this potential economic and sociological revolution.

6. Proceedings

The 49th ARFTG Conference Digest, which includes 36 papers in 251 pages, was distributed at the conference. Ordering information is available on the ARFTG web site or from the ARFTG Executive Secretary (+1-602-839-6933).


7. Future Conferences

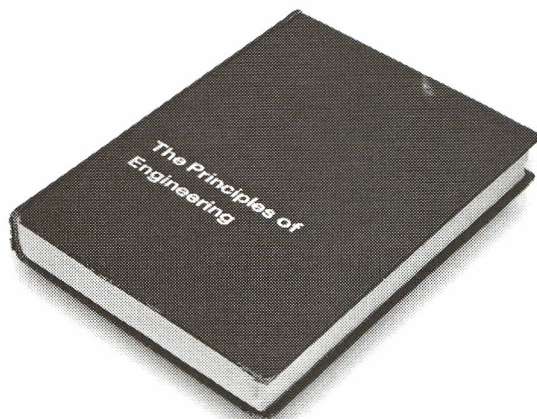
The 51st ARFTG Conference

will be held in Baltimore on Friday, June 12, 1998 in conjunction with the 1998 IEEE MTT-S International Microwave Symposium. The meeting topic is "Characterization of Spread Spectrum Components and Systems." In order to continue its focus on broadband telecommunications, ARFTG will co-sponsor a Joint Session with the 1998 IEEE MTT-S International Microwave Symposium on the topic "Broadband Telecommunications Systems" during the week of June 8 in Baltimore. A second Joint Session will cover "Digital Interconnection Techniques and Characterization at GHz Frequencies."

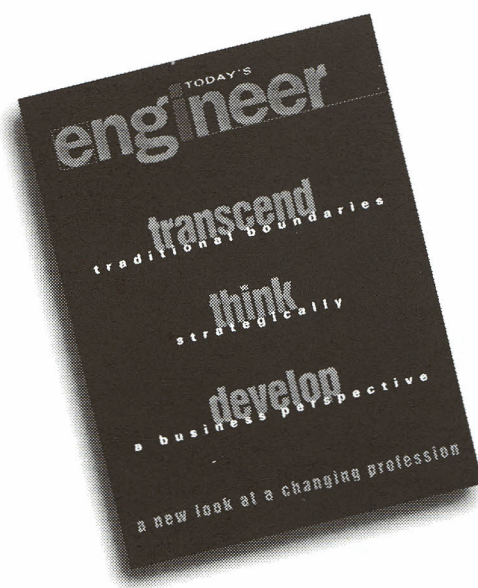
In addition to its odd-numbered conferences in the spring, ARFTG presents an even-numbered conference each fall during the week after Thanksgiving. The 50th ARFTG Conference, on "Measurement Techniques for Digital Wireless Applications," will take place on December 4-5, 1997 at the Benson Hotel in Portland, OR. ARFTG and NIST will also present their fourth annual Microwave Measurements Short Course on December 2-3.

8. More Information

More information on ARFTG and its conferences is available on the ARFTG Web Site at <http://www.arftg.org>. 



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Intelligent Vehicles '98

October 28-30, 1998

Stuttgart, Germany

The IEEE/IES Intelligent Vehicle Committee organizes an international symposium once every year in cooperation with other related institutions since 1989 in Detroit, Tokyo, and Paris.

These symposia have a single session format so that all the attendees remain in a single room for multilateral communications in an informal atmosphere. As another tradition, the meetings have enthusiastic participation from industry as well as universities. Demonstrations of test vehicles are strongly encouraged. The topics cover

Sensing (Vision, Millimeter Radar, Laser Radar, etc.)
Control (Neural Nets, Fuzzy Logic, etc.)
Communication
Social and economic issues related to ITS (Intelligent Transportation Systems)
Real-Time Traffic Control, Navigation, and other related issues

Please send three copies of an one-page abstract to Ichiro Masaki whose address is included below. The deadline for the abstracts is *March 15, 1998*.

If you would like to have your name on our mailing list, please write "Intelligent Vehicles" on the back of your business card (or a card with your address, phone, fax, and e-mail), and mail it to:

Stefan Hahn
Daimler-Benz Research
D-70546, Stuttgart, Germany
Phone (+49) 711-1741415, Fax (+49) 711-17-41454
Email: hahn @ str.daimlerbenz.com

OR

Ichiro Masaki
Massachusetts Institute of Technology
Room NE43-721, 545 Technology Square, Cambridge, MA 02139, USA
Phone: (+1) 617 - 253 - 8532, Fax (+1) 617-258-7334
E-mail: masaki @ mit. edu

Preliminary Call for

Papers ITSC '99

IEEE Conference on Intelligent Transportation Systems



Tokyo, Japan
October 5-8, 1999

The **Institute of Electrical and Electronics Engineers (IEEE)** is sponsoring a professional-level conference on basic research and present and future application of leading-edge advances in communications, computers, control and related electronics-based technologies to **Intelligent Transportation Systems (ITS)**.

Program Topics

- Sensors (infrastructure & vehicle-based)
- Communications (wide area & vehicle-to-roadside)
- Man-machine Interfaces (displays, artificial speech, ...)
- Decision Systems (expert systems, intelligent agents, ...)
- Simulation (continuous, discrete, real-time)
- Reliability & Quality Assurance
- Imaging and Image Analysis
- Information Systems (databases, data fusion, security)
- Computers (hardware, software)
- Control (adaptive, fuzzy, cooperative, neuro, large systems)
- Technology Forecasting & Transfer
- Systems (engineering, architecture, evaluation)
- Signal Processing
- Standards

To submit a paper:

Five (5) copies of draft papers must be submitted by **February 1, 1999**. The cover page should include

- Author's affiliation, return address, phone number, and email address
- The title and topic of the paper
- A brief abstract

Draft papers will be reviewed for technical content, originality, completeness and clarity. They should be of sufficient length for such a review but not more than **15** pages. Notification of Acceptance is scheduled for **May 1, 1999**.

Final camera-ready papers, due **July 1, 1999**, are limited to **6** pages in length (including graphics).

Submit to:

Professor Katsushi Ikeuchi - ITSC '99
Department of Electrical Engineering and Electronics
Institute of Industrial Science
The University of Tokyo
7-22-1 Roppongi, Minato-ku
Tokyo 106, Japan

email: ki@iis.u-tokyo.ac.jp
tel/fax: +81-33401-1433

Important Dates

- Paper submission deadline February 1, 1999
- Notification of acceptance May 1, 1999
- Camera-ready copy for proceedings due July 1, 1999

Conference Organizing Committee

- Organizing Chair: Fumio Harashima, E. Ryerson Case
- General Chair: Shigeo Wako, Ichiro Masaki
- Program Chair: Masao Sakauchi, Chuck Thorpe
- Local Arrangement Chair: Katsushi Ikeuchi
- Financial Chair: Masayoshi Aoki
- Conference Secretary: Yoichi Sato

More information will be available at <http://www.cvl.iis.u-tokyo.ac.jp/itsc99/>.



**1998 Wireless Communications Conference
Colorado Springs, CO USA August 9-12, 1998
<http://www.boulder.nist.gov/wcc>**

ADVANCE NOTICE

1998 Wireless Communications Conference (WCC'98)

Sheraton Colorado Springs, Colorado Springs, Colorado
August 9-12, 1998

Having expanded beyond its original venue, the Wireless Communications Conference moves in 1998 to the Sheraton Colorado Springs, a luxurious resort hotel with fine amenities and extensive and convenient conference facilities. The hotel is only seven miles from the Colorado Springs Airport, which offers excellent connections and low fares. Colorado Springs is home to many telecommunications businesses and is one of the world's most beautiful tourist destinations, particularly in the summer season. With the excellent response to WCC'97, and with the extensive publicity to be generated by the many press representatives in attendance, we are confident of continued strong growth. This means an even bigger audience for your important technical results and product demonstrations.

ADVANCE CALL FOR PAPERS

Due to its broad focus and single-track format, WCC'98 offers authors an outstanding venue with a sophisticated audience of your customers, suppliers, and competitors. Our IEEE Conference Proceedings ensures wide distribution of your archival publication. We will offer significant registration discounts to speakers and will provide speakers with valuable publicity through listings and hyperlinks on our highly-visible World Wide Web site.

We seek original, practical technical presentations in wireless technologies including:

- systems: LMDS, wireless LANs, PCS, cellular, paging, etc.
- active components: technology, modeling, linearity, characterization, etc.
- passive components: integrated passives, filters, resonators, etc.
- packaging/integration: ceramics, MCMs, miniaturization, etc.
- antennas, propagation, electromagnetic compatibility, and interference
- measurements: digital modulation, nonlinearity characterization, etc.

Authors are asked to submit five copies of a 1-2 page summary (including figures) to the Technical Program Chair by March 2, 1998. Submissions will be evaluated for originality, significance of the work, and interest to a broad audience. Authors will be notified of acceptance by May 1, 1998. Final accepted papers (3-5 pages in length) must be received in camera ready form by June 12, 1998 to be included in the published Proceedings.

For submission information, contact the Technical Program Chair:

Dr. Michael S. Heutmaker
Lucent Technologies, Princeton, NJ
tel: +1-609-639-3116
fax: +1-609-639-3197
heutmaker@lucent.com



**1998 Wireless Communications Conference
Colorado Springs, CO USA August 9-12, 1998
<http://www.boulder.nist.gov/wcc>**

EXHIBITION

WCC'98 includes a tabletop exhibition beginning on Tuesday afternoon, August 11, 1998. We have secured exhibit space immediately adjacent to the technical sessions. As in 1997, we expect a large press contingent at the conference, which makes WCC'98 an excellent platform for news and product announcements. We offer exhibitors useful hyperlinks from our popular World Wide Web site. To get in line for your choice of table for 1998, please contact the Exhibits Chair:

Michael Fennelly
ATN Microwave, Inc.
N. Billerica, MA
tel: +1-508-667-4200 x18
fax: +1-508-667-8548
mfennelly@atn-microwave.com

SUPPLEMENTARY TECHNICAL EVENTS

WCC'98 plans to continue and possibly expand on the successful Workshop and Panel Session program begun in 1997. We are particularly interested in adding a full-day workshop on Sunday, August 9. We also welcome industry groups and committees to consider co-locating their events with WCC'98 and offer to coordinate on publicity, local arrangements, etc. We welcome your suggestions and offers to organize events. Please direct your suggestions to the General Chair:

Dr. Roger B. Marks
National Institute of Standards & Technology
Boulder, CO
tel: +1-303-497-3037
fax: +1-303-497-7828
r.b.marks@ieee.org

THE CONFERENCE SITE

For information on the conference site and available facilities, please contact the Local Arrangements Chair:

Mr. John G. (Jack) McIlnay
The MITRE Corporation
Colorado Springs, CO
tel: +1-719-572-8341
fax +1-719-572-8477
mcilnay@mitre.org

THE WCC'98 MAILING LIST

To receive updates on WCC'98, please send your address (email address preferred) to the Registration Chair:

Mr. George Jankovic
Microwave Online Services Co.
Boulder, CO
tel: +1-303-415-9233
fax: +1-303-415-9238
george@mosco.com

NEW VOLUNTEERS

WCC'98 needs additional volunteer support, particularly in the areas of publicity and publications. Please contact the General Chair if you are interested in this opportunity to support your profession and develop new skills.

Watch <http://www.boulder.nist.gov/wcc> for the latest information on WCC'98!



1998 Asia-Pacific Microwave Conference — APMC'98 —

December 8-11, 1998
Pacifico Yokohama, Yokohama, Japan



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CONFERENCE SERVICES:
REALIZE INC.
E-mail: rlz@ppp.bekkoame.or.jp

APMC'98
Home page address
<http://www.ieice.or.jp/iinkai/apmc/jpn/index.html>

First Call for Papers

The 1998 Asia-Pacific Microwave Conference (APMC'98) will be held at the Convention Center in Pacifico Yokohama, Yokohama, Japan, on December 8-11, 1998. This conference is organized and sponsored by the Institute of Electronics, Information and Communication Engineers (IEICE) of Japan, and is cooperatively sponsored by IEEE MTT-S, URSI and IEEE MTT-S Tokyo Chapter.

CONFERENCE TOPICS

- | | |
|--|---|
| 1. Solid State Devices and Circuits | 14. Remote Sensing |
| 2. FET, HEMT, HBT and other Devices | 15. Microwave Medical/Biological Applications |
| 3. Low-Noise Devices and Techniques | 16. EMC/EMI |
| 4. High-Power Devices and Techniques | 17. Active Phased Array Antenna Systems |
| 5. Signal Generation, Frequency Conversion and Control Circuits | 18. Scattering and Propagation |
| 6. Monolithic Integrated Circuits | 19. Electromagnetic Field Theory |
| 7. Passive Devices and Circuits | 20. Computer Aided Design |
| 8. Packaging Techniques | 21. Microwave Antennas |
| 9. Guided Waves | 22. Microwave Photonics |
| 10. Filters and Resonators | 23. Microwave Superconductivity |
| 11. Ferrite and Surface Wave Components | 24. Submillimeter Wave Techniques |
| 12. Microwave and Millimeter Wave Systems | 25. Measurement Techniques |
| 13. Communication Systems (Satellite, Mobile/Personal and Terrestrial) | 26. Others |

Submission Guidelines: All paper submissions must be in English. Fax and e-mail submittals cannot be accepted.

Authors are invited to submit

1. Ten (10) copies of a 30-50 word abstract on a single separate sheet. This sheet should indicate the title, author(s) of the paper, complete mailing address, FAX number, E-mail address, statement specifying the most appropriate topic from the preceding list, and author's preference of oral or poster presentation.
2. Ten (10) copies of a 500-1000 word summary with no more than four (4) pages of supporting illustrations. The title and author's name(s) should be on the front page of each copy.

The official language of the conference will be English.

TIMETABLE:

Paper Submission Deadline:
June 1, 1998
Notification of Acceptance:
August 1, 1998
Camera-Ready Manuscript Deadline:
October 1, 1998

MAIL TO:

Dr. Hiroyo Ogawa
Chairperson, Technical Program Committee
APMC'98
c/o REALIZE INC.
4-1-4 Hongo, Bunkyo-ku, Tokyo 113
Japan

WORKSHOPS AND SHORT COURSES

The APMC'98 provides exciting workshops and short courses to learn from a group of specialists in a wide range of timely and interesting subjects.

MICROWAVE EXHIBITION '98

The Microwave Exhibition in association with the Conference will be held at the Exhibition Hall in Pacifico Yokohama on December 8-11, 1998. Please contact the following address for further information:

Microwave Exhibition '98

c/o REALIZE INC., 4-1-4 Hongo, Bunkyo-ku, Tokyo 113, Japan

Tel: +81-3-3815-8590 Fax: +81-3-3815-8529 E-mail: rlz@ppp.bekkoame.or.jp

JAPAN MICROWAVE PRIZE

During the APMC'98, the Japan Microwave Prize will be awarded to the authors selected from those accepted for presentation at the APMC'98 by the Japan Microwave Prize Committee, as outstanding contributions to the microwave field.

SUPPORT PROGRAM FOR SPEAKERS

A financial support program is available for a limited number of authors from developing countries. Candidates are requested to send an application letter describing their reasons for requesting assistance under this program, together with a copy of their submitted paper, to the following address:

Dr. Masaaki Kuzuhara, Vice Chairperson of Technical Program Committee

c/o REALIZE INC., 4-1-4 Hongo, Bunkyo-ku, Tokyo 113, Japan

Tel: +81-3-3815-8590 Fax: +81-3-3815-8529 E-mail: rlz@ppp.bekkoame.or.jp

YOKOHAMA

Yokohama is situated on the southwestern coast of Tokyo Bay and lies just 30 kilometers south of Tokyo. The port of Yokohama, a naturally blessed harbor surrounded by gently undulating hills, was opened in 1859 and ever since has played a major role as the largest international trading port of Japan.

Among its attractions is a thriving Chinatown, where visitors can enjoy first-class Chinese cuisine. To the south of Yokohama lies historical and cultural Kamakura - once the capital of the shogunal government between 1192 and 1333.

Those attendees who desire less expensive accommodations during the APMC'98 period should contact the Steering Committee for information on the home-stay program of the Yokohama Convention Bureau.

For further information, please contact:

Prof. Yoshio Kobayashi

Chairperson, Steering Committee

c/o REALIZE INC., 4-1-4 Hongo, Bunkyo-ku, Tokyo 113, Japan

Tel: +81-3-3815-8590 Fax: +81-3-3815-8529 E-mail: rlz@ppp.bekkoame.or.jp

APMC'98

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Larry Dickens 410-765-2075
Daniel C. Buck 410-761-6966

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Lee Phelps 301-428-4569
Jeff Pond 301-767-2862
Pete Stenger 410-993-7949

Panel Sessions

Shyam Bajpai 301-457-5225
Saurabh Dalal 703-560-5000 x1-2844

Special Sessions

Robert A. Moore 410-768-5233
Michael Frankel 202-404-8718

Student Papers

Ayub Fathimulla 410-964-4066
Kawthar Zaki 301-405-3674

Digest

Raymond Meibner, Vtro
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email: meibnerr@vitro.com

CDROM: Eric Funk, University of Maryland
301- Fax: 301-
email: yag@eng.umd.edu

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Sally Morse 410-461-5821

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301-497-9900 Fax: 301-497-0207

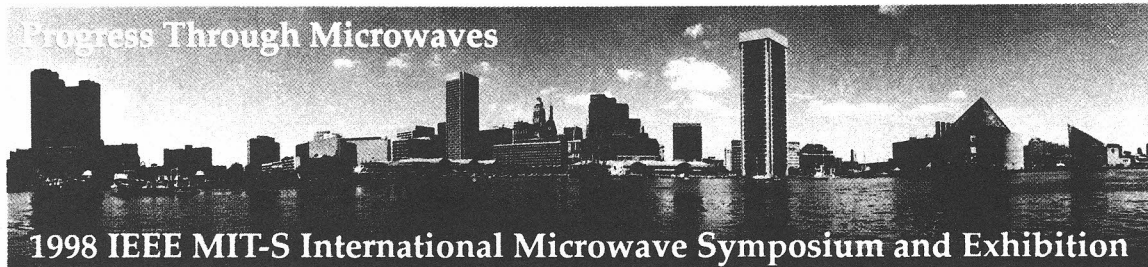
Exhibit

Harlan Howe and Howard Ellowitz
Horizon House Publications
617-769-9750 Fax: 617-769-5037
email: mwj@mwjournal.com

Conference Services

Larry Whicker, LRW Associates
704-841-1915
email: lrvassoc@aol.com

Progress Through Microwaves



1998 IEEE MIT-S International Microwave Symposium and Exhibition

Baltimore, Maryland June 7-12, 1998

FIRST CALL FOR PAPERS

The **1998 IEEE MTT-S International Microwave Symposium (IMS)** will be held in Baltimore, Maryland on June 7-12 as the centerpiece of *Microwave Week 1998*. Contributed papers describing original work on the utilization and application of microwave theory and techniques are solicited. The *Symposium* subcommittee topics and their particular areas of interest are listed on the third page of this brochure. Additional information is available at <http://www.ieee.org/mtt/mtt.html>

1998 IEEE Radio Frequency Integrated Circuit (RFIC) Symposium

The second annual *RFIC Symposium* will be held in Baltimore during June 7-9, 1998 in conjunction with the *1998 MTT-S International Microwave Symposium*. Papers are solicited describing original work on highly integrated IC design, fabrication, testing and packaging that supports RF, microwave and millimeter-wave applications. Papers for this conference must be submitted by December 1, 1997 to: 1998 *RFIC* TPC Chairman, c/o LRW Associates/Chesapeake Mailing Services, 707 E. Ordinance Road, Suite 401, Baltimore, MD 21226-1741 USA. Indicate "RFIC" as the conference choice on the **Author Information Form**. For more information, please contact the Technical Program Chairman: Christian Kermarrec, 617-937-1217, Fax 617-937-1011, christian.kermarrec@analog.com.

RF Wireless Technology Focused Sessions

Selected papers from both the *RFIC Symposium* and the *IMS* will be featured on Tuesday, June 9, 1998 in the area of RF Wireless Technology.

51st Automatic RF Techniques Group (ARFTG) Conference

This conference will be held in Baltimore on Friday, June 12, 1998 in conjunction with the *1998 IEEE MTT-S International Microwave Symposium*. This year's meeting will continue *ARFTG's* leading-edge telecommunications focus, with the topic of *Characterization of Spread Spectrum Telecommunications Components and Systems*. Submit 500-1000 word summaries by March 13, 1998 to John Gregory Burns, Northrop Grumman, P. O. Box 1521, Mail Stop 3K13, Baltimore, MD 21203 USA. Contact him at 410-765-7331 or burns.john@postal.essd.northgrum.com. For information on two *ARFTG/IMS* Joint Sessions, see the back page of this announcement. For detailed and updated information, check the Web site.

SUBMISSION DEADLINES

September 1, 1997

December 1, 1997

March 13, 1998

Panel Session, Workshop, and Special Session proposals
International Microwave Symposium & RFIC papers
ARFTG papers

Sorry, no Fax or e-mail submittals.

For the latest information, visit <http://www.ieee.org/mtt/mtt.html>

Authors will be notified of the status of their submission by Monday, January 26, 1998. Authors of accepted papers will receive copyright release forms and instructions for publication and presentation. Final manuscripts for publication in the *Symposium Digest* will be required by Monday, March 2, 1998. In addition to camera-ready copy, authors of accepted papers will be required to provide a version of their material in electronic format. Instructions will be included in the kits sent to authors.



Sponsored by the Baltimore and Washington, DC/Northern Virginia Chapters IEEE MTT-S



Mailing address: IEEE MTT-S 1998 • PO Box 18507 • Baltimore, MD 21240

Local Arrangements: Frank Halgas, Brian Sequeira, John Jacobi Publications: John Margosian

ARFTG Liaison Greg Burns, Northrop-Grumman 410-765-7331 Historical Exhibit: Ted Nelson, Jeff Kruth, Warren Cooper

PAPER SUBMISSION REQUIREMENTS

Please submit a **synopsis** and **author information form** for each paper.

- The **Synopsis** includes the title of the paper, the name(s) and affiliation(s) of author(s), a 30- to 50-word abstract, and, continuing on the same page, a 500- to 1000-word summary. Include supporting illustrations as needed. The introduction should include a clear indication as to what is original and why the author believes it is important to the microwave community. (See Evaluation Criteria on the first page.) The clarity with which the summary presents its information will be used to judge the ability of the author to communicate to the conference attendees. Fifteen copies are required.
- The **Author Information Form** is included in this brochure (see next page). The submitting author must indicate the conference choice, the length/type of presentation, and the topic category. The submitting author must sign the statement indicating that the same or similar material has not been submitted to any other publication and will not be until disposition is determined by the *Symposium*.

IMS Paper Evaluation Criteria – All submissions are reviewed by subcommittees of the *Symposium* Technical Program Committee. The scoring criteria used are based upon equal weighting of the following four factors:

Originality – The contribution must be unique and significant.

Quantitative content – The summary should give an explicit description of the work with complete supporting data and adequate references to the existing literature.

Quality – The writing and figures must clearly communicate the authors' purpose and results.

Interest to MTT-S membership – Why should this conference and a particular subcommittee support this work?

Language – Text must be in English.

Choice of Conference – By indicating your choice on the form, you can submit a paper to either the *IEEE MTT-S International Microwave Symposium* or the *IEEE Radio Frequency Integrated Circuit Symposium*. Do not submit the same material to both. Indicate if your *RFIC* or *IMS* paper covers RF Wireless Technology so that it can be included in the RF Wireless Technology focused session on Tuesday, June 9, 1998. See the first page of this announcement for information on *ARFTG* submission.

Type of Presentation – The *International Microwave Symposium* offers three types of presentations. *Full-length* papers (20 minutes) report significant contributions, advancements or applications of microwave technology. *Short* papers (10 minutes) typically report specific refinement in the state-of-the-art. *Interactive Forum* papers provide an opportunity for authors to present theoretical or experimental material in poster format, or to display hardware, perform demonstrations, and conduct discussions in an informal manner with interested colleagues. The author's preference will be honored where possible, but the paper will be placed in the most appropriate category, consistent with the constraints of the technical program.

Topic Categories – The selected topic categories will be used to determine the appropriate reviewers and sponsorship of the papers submitted to the *International Microwave Symposium*. Choose three topics from the list on the following page and prioritize them on the form. Use the letter to the left of the topic to indicate your choices.

Clearances – Authors are cautioned to obtain all required company and government clearances prior to submittal of summary. A statement signed by the submitting author that such clearances have been obtained must accompany the final manuscript of accepted papers to be published in the Symposium Digest.

Mail submissions to:

International Microwave Symposium 1998
c/o LRW Assoc./Chesapeake Mailing Services
707 E. Ordnance Road, Suite 401
Baltimore, MD 21226-1741 USA
Telephone: 410-768-8757

Submission must be received by **Monday, December 1, 1997.**

Late submissions will not be considered. Sorry, Fax and e-mail submittals *cannot* be accepted.

Acknowledgment – If acknowledgment of receipt of papers is desired, include a self-addressed, stamped postcard with the title of your paper noted.

INTERNATIONAL MICROWAVE SYMPOSIUM TOPICS AND SUBCOMMITTEES

- | | |
|--|---|
| <p>B Biological Effects and Medical Applications
Microwave techniques in biology, medicine, hyperthermia, imaging</p> <p>C Passive Components
Striplines, microstrip, planar transmission lines, transitions</p> <p>D Filters and Multiplexers
Microwave and millimeter-wave filters and multiplexers</p> <p>E Ferrite Components
Ferrite circulators, isolators, switches, other ferrite components</p> <p>F Acoustic and Surface Wave Components
SAW filters, resonators, delay lines, other surface or bulk acoustic devices</p> <p>G Signal Generation, Frequency Conversion, etc.
Oscillators, mixers, frequency multipliers, attenuators, phase shifters, switches</p> <p>H Nonlinear Modeling and Analysis
Large signal and nonlinear models, simulation techniques, distortion analysis</p> <p>I Transistor Power Amplification
Transistor amplifier design and performance, discrete or IC (Submit low noise papers to Topic K.)</p> <p>J High Power Generation, Amplification, and Control Circuits
TWTS, gyrotrons, sources and control from watts up to megawatt levels</p> <p>K Low Noise and Receivers, etc.
Low-noise receivers, amps, detectors; receiver amps; log, limiting, AGC</p> <p>L Advances in Hybrid Technology
Microwave hybrid technology, substrates, assembly techniques</p> <p>M Monolithic Technology
MMIC processes, passive and active devices (Submit circuit papers to Topics G, I, K, etc.)</p> <p>N Millimeter- and Submillimeter-wave Technology
Active and passive techniques (incl. antennas) above 30 GHz (Submit device papers to Topic M, active antenna papers to Topic Z.)</p> <p>O Field Theory
Theory of electromagnetic fields, solution to field problems (See also Topic P.)</p> <p>P EM Analytical and Numerical Techniques
Analytical and computer techniques for solving electromagnetic problems</p> | <p>Q CAD Procedures, Techniques and Modeling
Computer-aided design, linear modeling, circuit analysis (Submit nonlinear models to Topic H.)</p> <p>R Guided Waves and Propagation Techniques
Modeling and measurement of waveguide structures, dielectric waveguide</p> <p>S Measurement Theory and Techniques
Network parameters, nonlinear characterization, time domain and noise measurements, dielectrics, field mapping</p> <p>T Microwave and Communication Systems
Digital radio, commercial and satellite communications</p> <p>TA Vehicular Technology
Intelligent transportation systems, collision avoidance, vehicle identification</p> <p>TB Wireless Technology
Cellular and personal communication systems, wireless LANs, RF ID systems</p> <p>TC Broadband Telecommunication Systems
Characterization of hardwired facilities, including coax, HFC (hybrid fiber coax), DSL (digital subscriber line)</p> <p>U Phased Arrays
Active and passive phased-array radar (or receiver) design techniques</p> <p>V Lightwave Technology and High-Speed Applications
Fiber-optic links, services, and communications systems; microwave optoelectronic circuits, devices, and interactions</p> <p>W Superconducting Technology
Superconducting microwave and millimeter-wave circuits and systems</p> <p>X Manufacturing, Production and Packaging
Manufacturing processes; yield improvement; device, IC, and subsystem packaging; assembly; thermal and stress modeling</p> <p>XC Digital Interconnection Techniques and Characterization at GHz Frequencies
High-speed plastic packaging, MCMs, and on-chip interconnections</p> <p>Y Digital Microwave Circuits
Digital circuits at microwave or millimeter-wave frequencies, or using microwave techniques</p> <p>Z Active and Quasi-Optic Antennas
Quasi-optical oscillators and amplifiers. microstrip and active antennas</p> |
|--|---|

AUTHOR INFORMATION FORM

Name of submitting author:	Date:
Affiliation:	Phone:
Address:	Fax:
	e-mail:
Submitting to which Conference? (check only one) <input type="checkbox"/> IMS <input type="checkbox"/> RFIC	<input type="checkbox"/> Check if Student Paper
Presentation Preference? (check only one) <input type="checkbox"/> Full-length <input type="checkbox"/> Short <input type="checkbox"/> Interactive Forum	
IMS Topic Area? (Prioritize 3 topics from the list above, using Topic letters) 1. _____ 2. _____ 3. _____	
Would you like your paper considered for the <i>RF Wireless Technology Focused Sessions</i> on Tuesday June 9, 1998? <input type="checkbox"/> YES	
Paper Title:	

STATEMENT THAT THIS MATERIAL IS NOT BEING SUBMITTED ELSEWHERE

Neither this material nor essentially similar material has been submitted to any other publication or meeting, and will not be submitted until disposition is determined by MTT-S, or until Monday, February 16, 1998. We understand that publication by MTT-S will require assignment of copyright for this material to the IEEE. Printed name and signature of submitting author confirming above:

Printed Name _____ Signature _____

ADDITIONAL SOLICITATIONS

ARFTG/IMS Joint Sessions

ARFTG and MTT-S will co-sponsor two *Joint Sessions* on the topics of *Broadband Telecommunications (TC)* and *Digital Interconnection Techniques and Characterization at GHz Frequencies (XC)*. Measurement papers are encouraged. Submit papers to the 1998 IEEE MTT-S International Microwave Symposium following instructions on pages 2 and 3; indicate "TC" or "XC" as the paper topic.

Student Paper Contest

A student paper contest will be held as part of the *Symposium*. Papers are submitted following the *Paper Submission Requirements* with an additional notation of "Student Paper" on the *Author Information Form*. Student papers will be reviewed in the same manner as all other conference papers. To be considered for an award, the student must have been a full-time student (9 hours/term graduate, 12 hours/term undergraduate) during the time this work was performed. The student must be the lead author of the paper and must present the paper at the *Symposium*. A statement must be attached by the student's advisor on university letterhead stating that the work is primarily that of the student. Papers accepted for the competition will be judged on content. First, Second, and Third Prizes will be awarded.

Proposals for Special Sessions (Focused and Honorary), Panel Sessions, and Workshops

Special Session (Focused and Honorary), *Panel Session* and *Workshop* proposal abstracts giving technical descriptions and names of proposed organizers and speakers must arrive by Monday, **September 1, 1997** to be considered. Sponsorship of an MTT-S Technical Subcommittee is required for *Special Sessions*, *Panel Sessions*, and *Workshops*. A list of subcommittee chairpersons and their contact information is available in the *IEEE MTT-S Committee Directory*. Send *Special Session* proposals to Bob Moore, 1243 Balfour Drive, Arnold, MD 21012 USA, 410-647-0968, Fax 410-768-5321, Work 410-768-5233. Send *Panel Session* proposals to Shyam Bajpai, NOAA/NESDIS, FB#4, Room 3010, Washington, DC 20233 USA, 301-457-5225, Fax 301-420-0932, s.bajpai@ieee.org. Send *Workshop* proposals to Lee Phelps, MA/COM, 22300 Comsat Dr., Clarksburg, MD 20871 USA, 301-428-4569, Fax 301-540-8512, phelpsl@mailback.macom.com.

Suggestions Solicited

We invite all MTT-S members to provide suggestions regarding the *Symposium* Technical Program. Be prepared to support your ideas with some time and effort if needed. Contact the Technical Program Committee Chairman Ed Niehenke, 410-796-5866, Fax 410-796-5829, e.niehenke@ieee.org, or the Technical Program Committee Vice Chairman, Denis Webb, 202-767-3312, Fax 202-767-0455, d.webb@ieee.org

HELP DISTRIBUTE THIS CALL FOR PAPERS, PLEASE!

Please feel free to copy, post, or further distribute this Call for Papers by any other means.
All prospective authors are welcome!

Visit the MTT-S web site at <http://www.ieee.org/mtt/mtt.html>

RAWCON'98

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Technical Program Chair

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Gerome R. Reeve, NIST

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Exhibition

Michael Fennelly, ATN Microwave

Publications

Gary Breed, Applied Microwave & Wireless

Registration

George Jankovic, RF Globalnet Website

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1998 IEEE

Radio And Wireless Conference

August 9-12, 1998 ■ Colorado Springs, CO, USA

CALL FOR PAPERS

The 1998 IEEE Radio and Wireless Conference (RAWCON'98) is new, but you may recognize many of the sponsors, organizers, and participants who helped make last year's Wireless Communications Conference a great success, with 50 outstanding presentations and 254 attendees from 14 nations. RAWCON'98 expects to continue that success by again focusing on the technology driving the advancement of commercial wireless communications, from systems to components to propagation. We will pay special attention to radio and radio-frequency issues.

RAWCON'98 sponsors:

- IEEE Microwave Theory and Techniques Society
- IEEE Communications Society
- IEEE Pikes Peak Section
- National Institute of Standards and Technology
- Institute for Telecommunications Sciences

RAWCON'98 offers authors an outstanding venue with a sophisticated audience of your customers, suppliers, and competitors. Our IEEE Conference Proceedings ensures wide distribution of your archival publication. We will offer significant registration discounts to speakers and will provide speakers with valuable publicity through listings and hyperlinks on our highly-visible World Wide Web site at <http://rawcon.org>.

We seek original, practical technical presentations in these wireless technologies:

- *System Architecture*, including third generation wireless systems, LMDS, wireless LANs, wireless local loop, PCS, cellular, paging, etc.
- *System Performance*, including base stations, mobiles, signal processing, digital modulation, linearization, etc.
- *Antennas and Propagation*, including antenna design, propagation modeling, electromagnetic compatibility, interference, etc.
- *Active Devices*, including linearity, modeling, characterization, RFICs, MMICs, etc.
- *Passive Components*, including integrated passives, filters, packaging technology, package design, etc.

Also, the Program Committee is particularly interested in papers on the following focus topics:

- *Wireless data systems*
- *Software radio architectures*
- *Infrastructure equipment design for wireless communications*
- *Active device technologies for wireless communications*
- *Applications of advanced antennas to mobile communications*

Authors are asked to submit five copies of a two-page summary (including figures) to the Technical Program Chair (TPC) by March 1, 1998. The summary must contain complete contact information (including email) for the corresponding author. Please contact the TPC for information about electronic submission of the summary, if desired. Direct submissions to Dr. Michael S. Heutmaker, Lucent Technologies, P.O. Box 900, Princeton, NJ 08542 (for non-postal shipment: Rte. 569 Carter Rd., Hopewell, NJ 08525); email: heutmaker@lucent.com; tel: +1-609-639-3116; fax: +1-609-639-3197.

Submissions will be evaluated for originality, significance of the work, technical soundness, and interest to a broad audience. Authors will be notified of acceptance by April 24, 1998. Final accepted papers (3-5 pages in length) must be received by the TPC in camera-ready form by June 12, 1998 to be included in the published Proceedings.

<http://rawcon.org>

European Microwave Week 1998

RAI Congress Center

Amsterdam, The Netherlands, 5-9 October 1998

CALL FOR PAPERS

In 1998, for the first time, three major European conferences are being organised the same week to form the biggest European Microwave Event:

- The European Microwave Conference (EuMC'98)
- The European Gallium Arsenide and related III-V compounds Application Symposium (GAAS98)
- The MTT-S European Wireless'98

are joining for the European Microwave Week 1998 (EuMW'98) in Amsterdam. A comprehensive program of technical presentations, focused sessions, workshops, industrial demonstrations as well as a large industrial exhibition will present the latest developments in the frame of RF, microwave and millimetre wave technology and applications. Sessions of common interest for two conferences will be organised jointly. Workshops will be held on Monday, October 5, Wednesday, October 7 and Friday, October 9.

European Microwave Conference

The aim of the European Microwave Conference is to present

the most recent advances in microwave theory and techniques. In addition to the regular scientific papers, application oriented papers are solicited to highlight new applications and implementations in the microwave and millimetre wave domain. Conference topics

1. Broadband communications
2. Mobile and personal wireless communications
3. Transportation systems
4. Remote sensing, including active and passive radar,
5. Communication channel modelling and system implication
6. Antenna modelling and simulation
7. Antenna design and performances
8. Millimetre and sub-millimetre waves - components, circuits
9. Field theory
10. Microwave and lightwave interaction
11. Passive components and circuits
12. CAD for passive components
13. Active circuits and systems (including MMIC)
14. Non-linear CAD of microwave circuits
15. Solid state devices modelling
16. Solid state devices technology
17. Microwave measurements
18. New microwave materials
19. Industrial, medical and scientific applications
20. Electromagnetic compatibility
21. Packaging and interconnects

EuMC 98 Addresses

Chairman:

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tel: +32 10 472304

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vanhoenacker@emic.ucl.ac.be

In addition to the regular scientific papers, application oriented papers are also solicited. These papers should describe components, sub-assemblies, or even sub-systems, which can be part of a system in development or already in production. The criteria used for the selection of a paper are its applicability to support future micro-/millimeterwave developments and its usefulness to other members of the microwave community. Application oriented papers will be reviewed separately, employing different evaluation criteria than those applied to academic contributions. Prospective authors are invited to submit a summary to the Conference Secretariat marked clearly EuMC'98 and indicating the topic number and the type of paper (scientific or application-oriented). EuMC Microwave Prize

The Management Committee will award the EuMC Microwave Prize of SF 1000 to the author(s) of the best paper presented at the Conference.

GAAS '98

European Gallium Arsenide and related III-V compounds Application Symposium.

The aim of this conference, the sixth GAAS, is to promote the discussion of recent developments and trends, and the

exchange of scientific and technical information of Gallium Arsenide and other compound semiconductors. Special emphasis will be given to applications, including telecommunications, automotive, sensor, military and space applications. Prospective authors are invited to submit a summary to the Conference Secretariat marked clearly GAAS'98 and indicating the topic number. Conference topics

1. Telecommunication applications
2. Automotive applications
3. Military and space applications
4. Non-microwave analogue applications
5. High-speed digital applications
6. Opto-electronic applications
7. Material, device technologies (including new technologies such as InP, SiC and GaN)
8. Reliability
9. Yield, statistical analysis
10. Low cost design and manufacturing
11. CAD, characterization and modelling
12. Assembly, integration packaging and testing

Addresses

Chairman:

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fax: + 31 71 5654596

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MTT-S European Wireless '98

The MTT-S European Topical Congress on Technologies for Wireless Applications will highlight the application up to system level of RF, microwave and millimetre wave technologies to all aspects of wireless communications. Contributions of original work are solicited in the field of wireless applications, including personal communication systems, local and wide area networks, stationary and mobile communication systems, global positioning systems and others.

Prospective authors are invited to submit the summaries to the Conference Secretariat marked clearly Wireless 98 and indicating the topic number. Conference topics

1. System design trade offs
2. Applications
UMTS/IMT2000
3. Antenna and path design
4. Applications in PCS, cellular, paging, wireless LANs, etc...
5. Components for wireless consumer products
6. High-speed digital processing
7. Design for manufacturing and for testing
8. Manufacturing technologies

9. Packaging and interconnection technologies
10. Wireless broadband communications
11. Wireless multimedia communications and millimetre waves Addresses

Chairman:

Claus Hackemesser
Deutsche Telekom Ag,
Head VZO, Reuterstrasse 122
D-53129 Bonn, Germany
tel: +49 228 181 6370
fax: + 49 228 181 17301

Information for authors to all three conferences

Authors should submit six copies of their summaries by mail and 1 summary by e-mail to:

EuMW'98
Conference Secretariat,
Microwave Laboratory,
UC Louvain-la-Neuve,
Batiment Maxwell,
B 1348 Louvain-la-Neuve,
Belgium
tel: +32 10 474020
fax: +32 10 478705
eumw98@emic.ucl.ac.be

The summaries should be in English, typed single space, and 2 or 3 A4 pages long, including graphs and diagrams. In the accompanying letter it should be stated that the paper is original and was not published elsewhere. The summary starts with title, author's name, affiliation, full address (including phone, fax, e-mail). It should include an abstract, a brief conclusion, and emphasise what is novel.

Authors will be notified of the status of their submission by June 1st, 1998. A complete manuscript will be required by July 13rd, 1998. Authors of accepted papers will receive instructions for publication and presentation. The paper is prepared to camera ready copy standard and must not exceed six A4 pages including diagrams, figures, etc.. In addition to camera-ready copy, authors may send their final version of their material in electronic format. Instructions will be included in the instructions for authors. Authors are responsible for obtaining publication approval from their employer.

Important dates

Deadline for submission of summaries February 9, 1998

Notification of acceptance June 1st, 1998

Submission of full paper July 13, 1998 Workshops, focused sessions

Workshops, short courses and focused sessions will be organised on the following subjects: simulation of telecommunication systems, reliability of microwave active devices, mm-wave measurement and calibration techniques, CAD of waveguide filters and multiplexers, commercial microwave sensors technology, monolithic microwave oscillators for modern communication and radar, communication channel modelling and more.

Industry activities

Industry activities will be arranged parallel to the Conference. Contact David Roberts at MEE to arrange industry tutorials or social functions to promote products.


Contact Details

For Exhibition enquiries

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E-mail: 100730.3647@compuserve.com

The European Microwave Week is organised by Microwave Engineering Europe on behalf of the European Microwave Conference Steering Committee. 



RADARCON '98

1998 IEEE Radar Conference

CHALLENGES IN RADAR SYSTEMS AND SOLUTIONS

Sheraton Park Central - Dallas, Texas - May 12-14, 1998

Since the invention of radar, each succeeding system solution has been challenged with increasing performance demands. For the last decade added attention has been focused on lowering the life cycle cost. Sometimes new technologies and/or approaches introduce problems of their own.

Unclassified papers addressing the aspects of radar technology, applications, and signal/data processing will be presented. Emphasis is given to original work defining current problems in radar systems, experiences with current approaches, and proposed solutions.

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Monday 11 May 1998

5:00-9:00 pm Registration/Social

Tuesday 12 May 1998

8:30-8:50 am Plenary, Russ Logan, IEEE LF
President, Red Team Cons. Eng.
8:50-9:00 am Tech. Prog. Intro., Porter Hull
9:00-10:20 am Session 1: RADAR SYS/SUBSYS
Chair.: Bill Long/Wayne Weigle
Northrup Grumman
10:20-12:00 Poster Session 1
11:00-12:00 Session 1: Continued
12:00-1:00 pm LUNCH: DR. David McQuiddy, IEEE F
Raytheon TI Systems
1:00-3:00 pm Session 2: SIGNAL PROCESSING
Chair.: Dr. Charles Chapoton/
Dr. Fred Webber
Raytheon TI Systems
3:00-5:00 pm Poster Session 2
3:40-5:00 pm Session 2: Continued
6:00-7:00 pm Reception/Cash Bar

Tuesday 12 May 1998 (Continued)

7:00 pm Banquet: Dr. Paul Kaminski,
Former Dep. Sec. Def. R&E

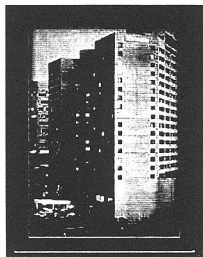
Wednesday 13 May 1998

8:30-10:10 am Session 3: Surveillance
Chair: Merrill Habbe, Boeing/
Joe Mynk, Hi-Tek Assoc.
10:10-11:50 Poster Session 3
10:40-11:50 Session 3: Continued
11:50-12:50 LUNCH: Richard Doviak,
Nat. Severe Storms Lab
12:50-3:10 Session 4: ANT/RADOMES
Chair: Dr. Dave Burks/
Dr. Bob Voges, Raytheon TISys.
3:10-3:40 Break
3:40-5:00 Session 5: Phenomenology
Chair: Guy Morris, Ga. Tech./
Dr. Sid Theis, Raytheon TISys.

Thursday 14 May 1998

8:00-12:00 TUTORIALS

For information on registration or Advance Program contact:



Cindy Barrand, Raytheon TI Systems
PHONE: (972)462-2453
FAX: (972)462-2410
E-MAIL: c-barrand@ti.com

Sponsored by the IEEE AES Society & the IEEE Dallas Section

ISPLMR'98

INTERNATIONAL SYMPOSIUM ON POWER LINE TO MICROWAVE RADIATION
Montreal, Quebec, Canada, August 3-5, 1998

Announcement and Call for Papers

First International Symposium on power line to microwave radiation (ISPLMR'98) will be held in Montreal, Quebec, Canada from 3rd to 5th August 1998. Authors are invited to submit a one page summary on topics of interest in power line to microwave radiation for review. Original paper should be submitted for the symposium. The following topics are of interest:

1. FDTD method for power line to microwave electromagnetic calculations.
2. FDTD method applied to biological effects (human and animals).
3. Dielectric measurement techniques for human and animal tissues.
4. Dielectric and conductivity data.
5. Human model and results.
6. Biological effects: theory and results on animal and human.
7. Radiation measurement techniques and instrumentation.
8. Reduction of radiation level from the source to human.
9. Special radiation effects due to power lines.
10. Cellular, MSAT/INMARSAT and PCS phones antennas.
11. Effects on human due to microwave oven radiation.
12. International standards on radiation.

Summary Submission (one page) Deadline for review:

July 5 1998.

Acceptance Notification to Authors:

July 15 1998.

Camera Ready Paper (4 pages) for Publication:

July 31 1998.

Contributions and inquiries should be send to:

**ISPLMR Office, P. O. Box 240, 30 Rue Lippee,
Les Coteaux, Quebec, Canada J7X 1H5.
Tel: (514) 620-3717, Fax: (514) 267-1144.**

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RAI Congress Center |



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