

December 9, 1997

Dr. Paul Withington
Time Domain Corporation
6700 Odyssey Drive
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Huntsville, AL 35806

School of Engineering

Department of
Electrical Engineering-
Systems

Communication
Sciences Institute

Dear Dr. Withington,

You are invited to participate in a **Workshop on Ultra-Wideband Radio** from the evening of May 25, 1998 through noon on May 28, 1998, at the Alisal Guest Ranch near Solvang, California. This workshop is being sponsored by the Communication Sciences Institute and the Integrated Media Systems Center of the University of Southern California, and the Army Research Office. The goal of this workshop is to determine those aspects of impulse radio and other ultrawideband radio techniques that have been realized, to uncover potential applications, and to define areas of future research. You have been invited because we feel that your special background and knowledge of communications will be helpful in achieving this goal.

The area of ultra-wideband (UWB) techniques is challenging, both from a system engineering and implementation point-of-view. Only a few small companies are actively pursuing UWB radio techniques, even though this approach to communication has the potential to be covert, to work well in difficult propagation environments, and to provide accurate ranging information. In this workshop, we propose to hold open discussions of the issues between academicians and industrial and government researchers and representatives. Proponents, skeptics, and interested parties are welcome!

The panel discussions of UWB radio will include (a) system issues, (b) implementation problems, (c) potential applications, competing systems, and regulatory constraints, (d) currently available UWB radio systems, with demos, and (e) a summary panel discussing results of the workshop, future directions, and potential funding sources. See the attachments for more details. The discussions at the workshop will be transcribed and published after editing and approval by the speakers. A copy of the proceedings will be mailed to each attendee. This workshop is by invitation only.

Please return the response form accompanying this invitation as soon as possible (even if you do not plan to attend). It will greatly assist us in insuring that we have the diversity and balance of interests necessary to make this workshop a success. Follow-up mailings will inform you in greater detail of local arrangements.

I hope to see you at the workshop in May!

Sincerely,



Dr. Robert Scholtz
Workshop Chairman
(213) 740-4433
scholtz@milky.usc.edu

Thanks for your help! Now you can see some details of the workshop. We probably chat around mid-January about developments.

PANELS

(Note: * XXX * indicates speakers and topics that have accepted a speaking position in making a panel overview statement.)

- **Theoretical Issues and Problems in UWB Transmission.** The effects and uses of excess bandwidth: Channel characterization, Rake receiver complexity, synchronization issues, interference rejection problems, signal design (for covertness, security, multiple access, interference rejection).

Ray Pickholtz, George Washington University, chair.
202-994-6538 pickholt@seas.gwu.edu

Henry Bertoni, Polytechnic Institute of New York (*propagation*)
Keith Chugg, U. Of Southern California (*joint estimation issues*)
Larry Milstein, UCSD (*UWB multicarrier spread spectrum*)
John Proakis, Northeastern University (*Rake receivers*)
James Spilker, Stanford Telecommunications (*synchronization* tentative)
John Treichler, Applied Signal Technologies (*signal detection* tentative)
Lloyd Welch, U. of Southern California (*coding issues*)

Allan Chedester, NSA (transmission security)
Vijay Kumar, U. of Southern California (pseudorandom code sets for multiple access)
Jim Lehnert, Purdue University (near far resistance as a function of bandwidth)
Antonio Ortega, U. of Southern California (video transmission over wireless)

- **Implementation issues in UWB radio.** Antenna technologies, circuit design challenges, potential manufacturing processes and monolithic implementations, useful CAD tools, and radio architectures.

John Choma, University of Southern California, chair.
213-740-4692 johnc@mizar.usc.edu

John R. Long, University of Toronto (*communication circuits*)
Robert Fleming, Aether Wire & Location (*UWB system implementation*)
Jim Kubinec, AMD (* Implementation Issues for UWB Radio in Mainstream Semiconductor Processes*)

Robert Dixon, R. C. Dixon & Associates
Aluizio Prata, U. of Southern California
Steven Brunson, Johns Hopkins University
Ranjit Gharpurey, Texas Instruments
Preston Jett, Time Domain Corporation
Roberto Aiello, Interval Research Corporation

- **Current UWB technology.** An introduction to current systems and demonstrations.

Paul Withington, Time Domain Corporation, chair.
205-922-9229 Paul.Withington@tdsi.com

Larry Fullerton, Time Domain Corporation (*impulse radio*)
Joe Inserra, CECOM (*performance of UTED LDR developed for USMC*)
John McCorkle, Army Research Laboratories (*UWB ground-penetrating radar*)
Benjamin Peterson, Coast Guard Academy (*Spread-spectrum indoor geolocation*)

Robert Fleming, Aether Wire & Location
Eric Funk, University of Maryland (optoelectronics for correlated reception)

- **Potential applications of UWB radio.** Indoor communications, ranging and navigation uses, military applications, competing technologies, regulatory constraints.

Ed Bedrosian, Rand Corporation, chair.

310-456-2740 Edward_Bedrosian@rand.org

Barry Dunbridge, TRW (*automotive applications*)

Joe Inserra, CECOM (*Army requirements*)

Hank Longaker, Trimble Navigation (*short range position location*)

Ted Rice, Naval Surface Warfare Center, Dahlgren (*Marine requirements*)

Karen Rackley, Federal Communications Commission (*regulation of UWB radio*)

Volker Bartels, Sennheiser Electronic Corporation

Steve Batsell, Oak Ridge National Labs (UWB for mobile IP ad hoc networks)

Phillip Feldman, Rand Corporation

Jae Heiner, Spectrum Astro

Tom Holden, Trimble Navigation

Iulian Nedelescu, Delphi Packard

Richard Nichols, Raytheon

Benjamin Peterson, U.S. Coast Guard Academy (Spread-spectrum indoor geolocation)

Brian Sadler, Army Research Laboratory

Paul Sass, CECOM (Army requirements)

Peter Schlager, AKG Harman International

James Watson (UWB mobile LAN for simulation)

Keith Townsend, North Carolina State University (network level issues for impulse radio)

Jorma Lilleberg, Nokia Mobile Phones

Greg Gibbons, consultant

- **Summary panel.** Research and development goals as summarized by prior panel chairs, potential funding sources.

Chairs or representatives from prior panels

Norm Whitaker, DARPA

Jonathan Hahn, Sytem Planning Corporation