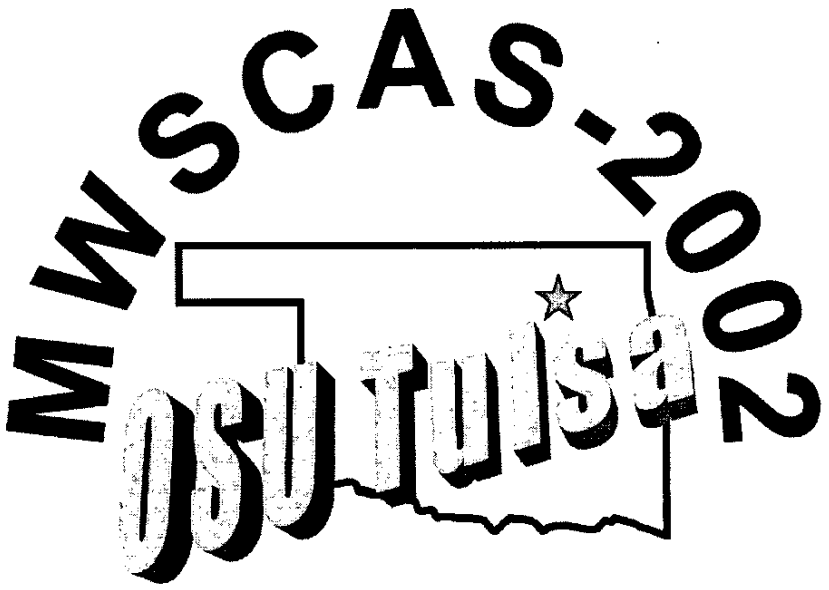

The 2002 45th Midwest Symposium on Circuits and Systems

Conference Proceedings

Volume II of III

August 4-7, 2002

Tulsa, Oklahoma

Co-Sponsored by the IEEE Circuits and Systems Society and the School of Electrical and Computer Engineering at Oklahoma State University

www.mwscas.org

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Message from the 45th MWSCAS Co-Chairs

Welcome to the 2002 45th Midwest Symposium on Circuits and Systems (MWSCAS-2002) to be held on the Tulsa campus of Oklahoma State University August 4-7, 2002. The conference hotel is the Adam's Mark Hotel of Tulsa. This year's conference is co-sponsored by the IEEE Circuits and Systems Society and the School of Electrical and Computer Engineering at Oklahoma State University. This is the second time that the School of Electrical and Computer Engineering at Oklahoma State University has hosted the conference; however, the last time was the 9th symposium held in 1966, 36 years ago. Oklahoma State University is proud to be one of only six universities to host the conference more than once (the other five are: University of Illinois, Iowa State University, Michigan State University, Notre Dame and University of Wisconsin).

We are very excited about the technical program for this year's conference. Over 550 papers were submitted to the conference including 193 papers submitted to the sixth annual MWSCAS Student Paper Contest. From the 193 papers submitted to the student paper contest, ten presenters and two alternates were chosen to present their papers Monday morning in the Student Paper Contest. This is an outstanding honor considering that only 5% of the papers submitted are selected for the contest. Many of the other papers have been scheduled in regular sessions – so all of the outstanding student papers will be presented at the conference even though we can only showcase ten of them. Complete details on the technical program can be found in the message from the Technical Program Chair Keith Teague.

While the technical program is certainly the core of MWSCAS, this year's symposium boasts several venues that add value to the conference. At the opening session on Monday morning, OSU-Tulsa President Gary Trennepohl and Dean Karl N. Reid will welcome everyone to OSU-Tulsa and to the symposium. Keynote addresses on Tuesday by Williams Communications Group C.E.O Howard Janzen and on Wednesday by Transmeta C.E.O. Matthew Perry will set the events for each day. We are fortunate to have Paul Kolodzy, the newly named chair of the Federal Communications Commission (FCC) Task Force on Spectrum Policy, organize and chair a panel discussion on the "Future of Telecom" at a Wednesday luncheon. On Monday, Terry Alderson of Boeing Wichita Division will deliver an invited talk titled "RFID Implementation". Tuesday morning John Worden of Seagate Technology will discuss "The Serially Attached SCSI (SAS) Interface", followed on Tuesday afternoon by Clifford Lau of the Office of Naval Research who will present a one-hour in-depth talk on "ONR/DOD Research Programs in Nanotechnology". The invited talks will conclude on Wednesday with Matthew Oommen, C.T.O. of Optical Datacom, who will discuss "Telecom Infrastructure Issues". MWSCAS will also host the IEEE Tri-State Conference on Sunday and the IEEE North America Chairs meeting on Tuesday in parallel with a great set of tutorials and short courses that will be offered all day Sunday. In addition to the great technical program, we will have exhibits everyday in Room 151 (Roberts Room).

We have also arranged for several technical and social tours. These include technical tours to Williams Communications, ABB, Flight Safety International and the Oklahoma State University main campus in Stillwater.. Social tours will include Frankoma Pottery, Woolaroc Museum, The Oklahoma City National Memorial, and the Philbrook and Gilcrease museums. Social events include a reception on Sunday evening in the Ballroom of the Adam's Mark Hotel, the awards luncheon on Monday that will include the awarding of the Myril B. Reed Best Paper Award from last year's conference and the awarding of the first, second and third place winners in the student paper contest. For those on the MWSCAS Steering Committee, this year's meeting and dinner will be on Monday at 6:30 pm in the Adam's Mark Hotel.

This symposium would not be possible without all of the authors who contributed papers to the technical program, the many volunteers that assisted with the technical program and with the conference organization, and the strong support of the many industrial and corporate sponsors who have given time, energy and money to support this symposium. We have tried to list all those who have contributed in the pages that follow, but so many contributed that it is not possible to recognize everyone. However, on behalf of the MWSCAS Conference Committee, we would like to thank all who contributed to the conference.

Please enjoy your stay in Tulsa and the many events associated with the conference. If time permits, we hope you will be able to explore Tulsa and Oklahoma while you are at the symposium. Tulsa is a wonderful city with many things to see and do. The MWSCAS web site lists a few of these.

Michael A. Soderstrand and Rao Yarlagadda
Oklahoma State University

Technical Program Chair's Message

Welcome to Tulsa and the 2002 45th Midwest Symposium on Circuits and Systems (MWSCAS-2002). I am very pleased you have chosen to attend, and I believe you will agree that this year's program is excellent. This is certainly a tribute to the high quality of the submissions, an excellent Technical Program Committee, and the many fine track and session chairs who have contributed their time and energy to organizing this year's Symposium. I hope you find the program stimulating and entertaining, and you enjoy your visit to Oklahoma.

This year's Symposium was organized with ten technical tracks, and nominally eleven technical sessions per track. These numbers varied based on the relative frequency of submissions, with Analog Circuits and Systems representing the largest track. This year's technical tracks, and the corresponding track chairs are:

- Analog Circuits and Systems (John Choma and Randy Geiger)
- Digital Circuits and Computer Arithmetic (Magdy Bayoumi)
- Programmable Logic, VLSI, CAD and Layout (Linda DeBrunner)
- Communications Networking (J-M Chung)
- Wireless Communications Systems (Michael Buehrer)
- Neural Networks and Control Systems (Martin Hagan)
- Digital Signal Processing (Victor DeBrunner)
- Digital Signal Analysis (Scott Acton)
- Power and Energy Systems and Power Electronics (Ward Jewell)
- RF, Microwave and Optical Circuits and Systems (James West)

All submitted papers were reviewed by session chairs and members of the Technical Program Committee. No distinction was made between lecture and poster submissions. A final decision on each paper was rendered at the Technical Program Committee meeting in June.

We have an exceptionally strong schedule of technical events planned this year. In addition to more than 500 paper presentations in 111 technical sessions, we are very fortunate to have special keynote addresses and invited presentations each day, plus an extraordinary panel discussion and luncheon, "The Future of Telecom", which will be held at the Greenwood Cultural Center adjacent to the OSU-Tulsa campus on Wednesday. It's very gratifying that these speakers have chosen to take time from their busy schedules to be with us at MWSCAS-2002.

The sixth annual MWSCAS Student Paper Contest will be held in its own session on Monday morning. During this special lecture session, the top ten student papers as determined by a special student paper contest committee chaired by Rick Branner will be presented. Be sure to attend and show your support for all the participants! The winners of this year's MWSCAS Student Paper Contest will be recognized and prizes awarded at the Awards Luncheon following the session. Also at the luncheon on Monday, the annual Myril B. Reed Best Paper award will be presented for 2001.

Thank you for your contributions and attendance at MWSCAS-2002. Through your participation attending sessions, submitting and presenting papers, serving as a session chair or on the Technical Program Committee, volunteering to help with activities at the Symposium, or by serving as a Symposium Sponsor, you have helped make this year's conference a huge success. I hope you have a wonderful time in Tulsa!

Keith A. Teague
Oklahoma State University

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MWSCAS 2002 Tutorials
Sunday August 4, 2002, 9:00 am – 5:00 pm

MWSCAS 2002 continues the tradition of providing cutting-edge short courses and tutorials on the Sunday before the conference. This year we have four short courses and tutorials available that include:

1. Edward J. Delp, Purdue University, *Digital Watermarking* (Full Day)
2. Scott C. Douglas, Southern Methodist University, *Blind Source Separation: Criteria, Methods, and Applications* (Full Day)
3. Susan Chinburg, Janice Hanson and Vincent Chong, Williams Communications Group, *Network Planning and Traffic Engineering using Modeling and Simulation Processes, a Systems Approach for the Entire Network* (Half Day)
4. Gabriel A. Rincon-Mora, *Integrated DC-DC Converters: A Topological Journey!* (Half Day)

Continuing Education Units (CEUs) are available both for the tutorials and technical sessions. Additional information is available at the MWSCAS registration desk and is included in your registration packet.

MWSCAS Opening Session
Monday August 5, 2002, 8:00 am – 8:20 am

As is the custom at MWSCAS, the opening session is planned to be short and to the point. We are pleased to have all of you here at OSU-Tulsa attending the 45th IEEE MWSCAS. To celebrate this event, Dr. Gary Trennepohl, President of Oklahoma State University-Tulsa will welcome everyone to OSU-Tulsa. Dr. Gary Trennepohl became the first President of Oklahoma State University-Tulsa on Sept. 1, 1999. He was formerly Dean of the College of Business Administration at Oklahoma State University in Stillwater. Trennepohl, 55, previously held faculty and administrative appointments at Texas A&M University (1986-1995, executive associate dean and Peters Professor of Finance), the University of Missouri-Columbia (1982-1986, professor and finance department chair), and Arizona State University (1977-1982, associate professor).

After the welcome by President Trennepohl, Dr. Karl N. Reid, Dean of the College of Engineering, Architecture and Technology of Oklahoma State University will provide a warm welcome from the College to all the MWSCAS attendees. Dean Reid has been Dean of the College since 1986 and is a graduate of Oklahoma State University and received his Ph.D. from Massachusetts Institute of Technology. He formerly was the head of the School of Mechanical and Aerospace Engineering at Oklahoma State University. Dean Reid is the founder of The Web Handling Research Center (WHRC) at OSU, which is one of fifty-two National Science Foundation Industry/University Cooperative Research Centers. The WHRC was initiated in 1986 and is the only center of its type in the world.

Myril B. Reed Best Paper Award for MWSCAS 2001

Each year, after the symposium is completed, the Technical Committee for the MWSCAS chooses the best paper for the symposium and announces the winner at the next MWSCAS. Hence, Robert L. Ewing, Chair of last year's MWSCAS held in Dayton Ohio, presented the winner of the 2001 Myril B. Reed Best Paper award. The winners were:

> *Henry H.Y. Chan and Zeljko Zilic*, "Substrate Coupled Noise Reduction and Active Noise Suppression Circuits For Mixed-Signal System-On-A-Chip Designs"

Both winners were present at the awards luncheon on Monday and were presented with a plaque in honor of winning this prestigious award. Further information on the Myril B. Reed Best Paper award, including past winners, can be found on the MWSCAS web site at: http://www.mwscas.org/reed.html

Student Paper Contest Award Winners

Nearly 200 entries were received for the ten slots and two alternates for the Student Paper Contest. Nine of the ten selected papers were able to present in the contest along with one alternate. The judges for this year's contest were:

- Ken Jenkins, Pennsylvania State University
- Wasfy Mikhael, University of Central Florida
- Roger Schultz, Halliburton Corporation
- Robert Stratton, IEEE Tulsa Section
- G. Rick Branner, University of California, Davis

Cash prizes were provided for first, second and third place contestants in the amounts of $1,000 (of which there were two), $500, and $300, respectively. There were also three fourth place prizes of a Seagate hard disk drive. The $1,000 first place prizes were provided by Halliburton Company (presented by Mr. Roger Schultz) and Phillips Petroleum Company (presented by Ms. Kay Wyatt). The $500 second place prize was also provided by Phillips Petroleum Company (presented by Ms. Kay Wyatt). The $300 third place prize was again provided by Phillips Petroleum Company (presented by Ms. Kay Wyatt). The three fourth place prizes of hard disk drives were provided by Seagate Technology (presented by Mr. John Worden). This year's winners were:

First Place ($1000 each)

Tommy Tsang, McGill University
Anthony Long, University of California, Santa Barbara

Second Place ($500)

Sebastian Magierowski, University of Toronto

Third Place ($300)

Omar Elkeelany, University Missouri

Forth Place (Seagate Disc Drives)

Biju Mullul Veedu, Oklahoma State University
Chuang Zhang, Louisiana State University
Zhangwen Tang, Fudan University

Further details, including winners of previous MWSCAS Student Paper Contests can be found on the MWSCAS web site at:

http://www.mwscas.org/mwscas_student_paper_contest.htm

Keynote Speaker
Tuesday August 6, 8:00 am – 9:00 am
OSU-Tulsa Auditorium, North Hall

Howard E. Janzen
Chairman, President & Chief Executive Officer
Williams Communications
"Telecom Market Place: A View from the Top"

Howard E. Janzen is chairman, president and chief executive officer of Williams Communications. Janzen has led Williams Communications in completing the largest next-generation fiber network in the U.S. The network has attracted a high-quality portfolio of bandwidth-centric customers who have committed to the Williams Communications network as their broadband enabler.

A recognized leader in the telecommunications industry, Janzen received the 2001 Ovations award from *Tele.com* magazine and COMNET for the company's extraordinary achievements in technology and operations. Under Janzen's guidance, Williams Communications' network has been awarded SuperQuest's "Best Built Core Backbone" for an unprecedented three consecutive years (1998-2000).

Janzen has 25 years experience in the telecommunications and energy industries. His career with former parent Williams began as a project engineer for Williams Pipe Line in 1979, and he has served in numerous management positions in the Energy and Gas Pipeline businesses during his 22 years. He was named head of the new Communications business unit formed in 1995 and became president and chief executive officer of Williams Communications Group in April 1997, which became an independent company in April 2001.

Janzen earned Bachelor of Science and Master of Science degrees in Metallurgical Engineering from The Colorado School of Mines and is a licensed Professional Engineer. He has also completed the Harvard Business School Program for Management Development. Janzen became a Colorado School of Mines Distinguished Achievement Medalist in 1996.

Janzen serves on the Board of Trustees at The University of Tulsa, the Bank of Oklahoma Board of Directors and on the Board of Trustees for the Hillcrest Healthcare System. He also serves on the Governor's Science & Technology Council for the State of Oklahoma and is a Commissioner for the Global Information Infrastructure Commission (GIIC). He serves on the Gilcrease Museum Board of Directors and is co-chairman of the Resources Campaign for The Colorado School of Mines. Janzen was recently inducted into the University of Tulsa, College of Engineering and Natural Sciences, Hall of Fame.

Keynote Speaker
Wednesday August 7, 8:00 am – 9:00 am
OSU-Tulsa Auditorium, North Hall

Matthew R. Perry, Ph.D.
President & Chief Executive Officer
Transmeta Corporation
"Mobile Computing"

Matt Perry joined Transmeta in April 2002 as President, Chief Executive Officer and a member of the Board of Directors. Transmeta develops and sells software-based microprocessors and related hardware and software technologies that enable computers to simultaneously offer long battery life, high performance and x86 compatibility. Transmeta's family of energy efficient Crusoe® microprocessors is targeted at the notebook and Internet appliance segments of the mobile Internet computer market, as well as ultra-dense servers and a range of embedded applications.

Before joining Transmeta, Perry held a series of management positions at Cirrus Logic, which he joined in December 1995. From April 1998 to April 2002, Perry served as Vice President and General Manager, during which period he managed, in succession, Cirrus' Embedded Processors Division, Crystal Products Division, and Optical Products Division. As Vice President and General Manager of the Crystal Products Division, Perry played an integral role in the development of the company's new consumer-focused digital entertainment vision. Also under Perry's leadership, Cirrus Logic developed the Maverick™ processor family, which quickly established worldwide leadership positions in the MP3 class of portable digital audio players.

Before joining Cirrus Logic, Perry held positions at Advanced Micro Devices where he served as Strategic Marketing Manager, and at Motorola as a Multimedia Systems and Applications Manager. Perry earlier served as an Assistant Professor of Electrical Engineering at Texas Tech University where he focused on signal and image processing research.

Perry serves on the Board of Directors for the Consumer Electronics Association, to which he was appointed in January 2002, and is widely recognized as an industry expert. In 2001, CNET declared that Perry "just might have as much influence on the shape of digital music as Napster's file-swapping service or any of the music studios." Perry also serves as a board member of the Austin Film Society.

He holds B.S., M.S. and Ph.D. degrees in Electrical Engineering from Oklahoma State University.

Panel Discussion and Luncheon
Wednesday, 12:15 pm – 1:45 pm
Greenwood Cultural Center

Paul Kolodzy, Chairman FCC Task Force on Spectrum Policy
The Future of Telecom

Paul Kolodzy, the newly named Chair of the FCC Task Force on Spectrum Policy, will chair a panel discussion on the "Future of Telecom". Panelists will consist of representatives of the telecom industry including some of the Chief Technology Officers of major telecom companies. Lunch will be served at 12:15 pm, and the panel discussion will begin shortly thereafter. Please join us for lunch and a stimulating discussion in the Greenwood Cultural Center. The Greenwood Cultural Center is located just behind Main Hall on the OSU-Tulsa campus.

Invited Presentations

RFID Implementation
Monday, August 5, 2:00-3:00 pm
OSU-Tulsa North Hall Room 260
Terry Alderson, *Boeing – Wichita Division*

Radio Frequency Identification (RFID) is an emerging technology that has had limited use in manufacturing environments. One of the premier aerospace companies discusses their journey through RFID. In this presentation they will share their journey with you, including an overview of the technology, initial findings, industry analysis, testing, pilots, business application, and the future use of RFID in their environment

The Serially Attached SCSI (SAS) Interface
Tuesday, August 6, 10:40-11:40am
OSU-Tulsa North Hall Room 260
John Worden, *Seagate Technology*

For more than 15 years, the Small Computer Systems Interface (SCSI) has been the mainstay enterprise storage rigid disc drive interface. In keeping with the computer industry's migration from bus architectures to switched serial interfaces, the new Serially Attached SCSI (SAS) interface extends the SCSI architecture into the future with higher interface performance, higher data integrity, and more flexible configurations. This presentation provides a technical overview of the SAS interface.

ONR / DoD Research Programs in Nanotechnology
Tuesday, August 6, 2:00-3:00 pm
OSU-Tulsa North Hall Room 260
Dr. Clifford Lau, *Office of Naval Research*

In January 2000 then President Clinton announced the National Nanotechnology Initiative to significantly increase the U.S. federal government's investments in nanotechnology. This initiative was the culmination of several years of planning by an interagency working group. Since then we have seen substantial increases in funding in the U.S. and all over the world. Nanotechnology has triggered the imagination of scientists and

engineers as the next industrial revolution. Nanotechnology is involved in many disciplines including physics, chemistry, materials, electronics, and others. The Navy/DoD nanotechnology research programs are focused on three areas of critical importance: nanomaterials by design, nanoelectronics including nanomagnetics and nanophotonics, and nanobiodevices. For DoD, nanotechnology offers the potential for enhanced capabilities in practically all areas of warfighting. In this presentation, Navy/DoD nanotechnology research programs and research opportunities in nanotechnology will be discussed.

Telecom Infrastructure Issues
Wednesday, August 7, 2:00-2:30 pm
OSU-Tulsa North Hall Room 260
Mathew Oommen, *Optical Datacom*

Mathew Oommen, Chief Technology Officer of Optical Datacom, will discuss several points concerning key telecommunications infrastructure issues that would address network challenges – enabling profitability of telecom companies in the future. This invited presentation will compliment the "Future of Telecom" panel discussion held at the Greenwood Cultural Center

Sponsors of the 45th IEEE International Midwest Symposium on Circuits and Systems

We gratefully acknowledge the generous support of the following organizations and individuals that have sponsored this year's MWSCAS:

- **IEEE Circuits and Systems Society**
- **Oklahoma State University**
- **National Science Foundation**
- **Williams Communications Group**, Tulsa, OK
- **Center of Excellence in Information Technology and Telecommunications (COEITT)**, Tulsa, OK
- **Phillips Petroleum Company**, Bartlesville, OK
- **Halliburton Company**, Dallas, TX
- **Seagate Technology, LLC**, Oklahoma City, OK
- **Frontier Electronic Systems**, Stillwater, OK
- **Agilent Technologies**, Fort Collins, CO
- **Optical Datacom**, Tulsa, OK
- **FlightSafety International**, Tulsa, OK
- **Sciperio**, Stillwater, OK
- **Oklahoma Gas & Electric**, Oklahoma City, OK
- **Ericsson Inc.**, Plano, TX
- **AFN Communications**, Tulsa, OK
- **Stillwater Designs - Kicker**, Stillwater, OK
- **Nomadics, Inc.**, Stillwater, OK
- **AEP-Public Service Company of Oklahoma,** Tulsa, OK
- **Williams**, Tulsa, OK
- **Kay and Steve Wyatt**, Bartlesville, OK
- **McLeodUSA, Inc.**, Tulsa, OK
- **WORLDCOM**, Tulsa, OK

MWSCAS 2002 Technical Schedule

Saturday August 3, 2002

6:00 pm – 8:00 pm	Registration – Adam's Mark Hotel Second Floor (near the hotel registration desk)

Sunday August 4, 2002

8:00 am – 2:30 pm	Registration – OSU-Tulsa North Hall First Floor
8:00 am – 6:00 pm	Email Room – OSU-Tulsa Main Hall First Floor Room 1308
10:00 am – 5:00 pm	IEEE Region 5 Chapters Meeting – OSU-Tulsa North Hall Room 106
9:00 am – 5:00 pm	Full-Day Tutorials – OSU-Tulsa North Hall Second Floor
2:00 pm – 5:00 pm	Half-Day Tutorials – OSU-Tulsa North Hall Second Floor
4:00 pm – 8:00 pm	Registration-- Adam's Mark Hotel Second Floor
6:00 pm – 8:00 pm	MWSCAS Welcome Reception – Adam's Mark Hotel Ballroom First Floor

Monday August 5, 2002

7:00 am – 5:00 pm	Registration – OSU-Tulsa North Hall First Floor
7:00 am – 6:00 pm	Email Room – OSU-Tulsa Main Hall First Floor Room 1308
8:00 am – 8:20 am	Opening Session: Welcome by OSU-Tulsa President Gary Trennepohl and Karl Reid, Dean of the College of Engineering Architecture and Technology – OSU-Tulsa Auditorium
8:20 am – 11:40 am	Student Paper Contest – OSU-Tulsa Auditorium, North Hall
12:15 pm – 1:45 pm	Awards Luncheon – Adam's Mark Hotel Ballroom First Floor
2:00 pm – 3:20 pm	Technical Sessions – OSU-Tulsa North Hall Second Floor
2:00 pm – 3:00 pm	Invited Presentation: RFID Implementation, Terry Alderson, Boeing – Wichita Division, OSU-Tulsa North Hall Room 260
3:20 pm – 3:40 pm	Afternoon Coffee Break – OSU-Tulsa North Hall Room 151
3:40 pm – 5:00 pm	Technical Sessions – OSU-Tulsa North Hall Second Floor
6:30 pm – 8:30 pm	IEEE MWSCAS Steering Committee Dinner and Meeting – Adam's Mark Hotel Promenade (Second Floor)

Tuesday August 6, 2002

7:00 am – 5:00 pm	Registration – OSU-Tulsa North Hall First Floor
7:00 am – 6:00 pm	Email Room – OSU-Tulsa Main Hall First Floor Room 1308

8:00 am – 9:00 am	Keynote Speech: Howard Janzen, CEO Williams Communications – "Telecom Market Place: A View from the Top", OSU-Tulsa Auditorium, North Hall
9:00 am – 10: 20 am	Technical Sessions – OSU-Tulsa North Hall Second Floor
10:20 am – 10:40 am	Morning Coffee Break – OSU-Tulsa North Hall Room 151
10:40 am – Noon	Technical Sessions – OSU-Tulsa North Hall Second Floor
10:40 am – 11:40 am	Invited Presentation: The Serially Attached SCSI (SAS) Interface, John Worden, Seagate Technology, OSU-Tulsa North Hall Room 260
Noon – 2:00 pm	IEEE North American Chapter Chair's Meeting – Adam's Mark Hotel Promenade (Second Floor)
1:00 pm – 5:00 pm	MWSCAS Career Fair – OSU-Tulsa Main Hall
2:00 pm – 3:20 pm	Technical Sessions – OSU-Tulsa North Hall Second Floor
2:00 pm – 3:00 pm	Invited Presentation: ONR / DoD Research Programs in Nanotechnology, Dr. Clifford Lau, Office of Naval Research, OSU-Tulsa North Hall Room 260
3:20 pm – 3:40 pm	Afternoon Coffee Break – OSU-Tulsa North Hall Room 151
3:40 pm – 5:00 pm	Technical Sessions – OSU-Tulsa North Hall Second Floor
5:30 pm – 11:30 pm	Discoveryland and the play *Oklahoma!* (Buses leave from Adam's Mark Hotel lower lobby in front of the Ballroom beginning promptly at 5:30 pm)
Wednesday August 7, 2002	
7:00 am – 4:00 pm	Registration – OSU-Tulsa North Hall First Floor
7:00 am – 6:00 pm	Email Room – OSU-Tulsa Main Hall First Floor Room 1308
8:00 am – 9:00 am	Keynote Speech: Matthew Perry, CEO Transmeta – *Mobile Computing* OSU-Tulsa Auditorium, North Hall
9:00 am – 10: 20 am	Technical Sessions – OSU-Tulsa North Hall Second Floor
10:20 am – 10:40 am	Morning Coffee Break – OSU-Tulsa North Hall Room 151
10:40 am – Noon	Technical Sessions – OSU-Tulsa North Hall Second Floor
12:05 pm – 1:45 pm	Luncheon and Panel Discussion "The Future of Telecom", chaired by Paul Kolodzy – Greenwood Cultural Center (adjacent to the OSU-Tulsa campus)
2:00 pm – 3:20 pm	Technical Sessions – OSU-Tulsa North Hall Second Floor
2:00 pm – 2:30 pm	Invited Presentation: Telecom Infrastructure Issues, Mathew Oommen, Optical Datacom, OSU-Tulsa North Hall Room 260
3:20 pm – 3:40 pm	Afternoon Coffee Break – OSU-Tulsa North Hall Room 151
3:40 pm – 5:00 pm	Technical Sessions – OSU-Tulsa North Hall Second Floor

Time	Auditorium	Room 140 - Posters	Room 151	Room 260
Monday August 05, 2002 8:00am-12:00pm	MAM0L-AUD **Student Paper Contest** *Chair: Rick Branner*			
Monday August 05, 2002 2:00pm-3:20pm		MPM1P-140 **Sensors, Analog Filters, Data Conversion** *Chair: Sherif Michael*	**EXHIBITS** ***Monday 2:00pm-5:00pm***	***2:00pm - 3:00pm*** **INVITED TALK:** **RFID Implementation** Terry Alderson, ***Boeing – Wichita Div.***
BREAK			***BREAK ROOM***	
Monday August 05, 2002 3:40pm-5:00pm		MPM2P-140 **Mixed Signal VLSI** *Chair: Igor Filanovsky*	**EXHIBITS** ***Monday 2:00pm-5:00pm***	
Tuesday August 06, 2002 8:00am-9:00am	***KEYNOTE SPEAKER:*** **Howard E. Janzen,** President & CEO Williams Communications **Telecom Market Place: A View from the Top**			
Tuesday August 06, 2002 9:00am-10:20am		TAM1P-140 **High Performance Digital Circuits and VLSI Design Methodologies** *Chair: Cristian Chitu*	**EXHIBITS** ***Tuesday 9:00am-5:00pm***	
BREAK			***BREAK ROOM***	
Tuesday August 06, 2002 10:40am-12:00pm		TAM2P-140 **VLSI Systems** *Chair: TBD TBD*	**EXHIBITS** ***Tuesday 9:00am-5:00pm***	***10:40am - 11:40pm*** **INVITED TALK:** **The Serially Attached SCSI (SAS) Interface** John Worden, ***Seagate Technology***
Tuesday August 06, 2002 2:00pm-3:20pm		TPM1P-140 **DSP System Design and Implementation** *Chair: Mohamad Farooq*	**EXHIBITS** ***Tuesday 9:00am-5:00pm***	***2:00pm - 3:00pm*** **INVITED TALK:** **ONR / DoD Research Programs in Nanotechnology** Dr. Clifford Lau, ***Office of Naval Research***
BREAK			***BREAK ROOM***	
Tuesday August 06, 2002 3:40pm-5:00pm		TPM2P-140 **Signal Processing** *Chair: Tran Thong*	**EXHIBITS** ***Tuesday 9:00am-5:00pm***	
Wednesday August 07, 2002 8:00am-9:00am	***KEYNOTE SPEAKER:*** **Matthew R. Perry** President & CEO Transmeta Corporation **Mobile Computing**			
Wednesday August 07, 2002 9:00am-10:20am		WAM1P-140 **Communications Systems** *Chair: Edward Daniel*	**EXHIBITS** ***Wednesday 9:00am-12:00pm***	
BREAK			***BREAK ROOM***	
Wednesday August 07, 2002 10:40am-12:00pm		WAM2P-140 **Neural Networks** *Chair: Roger Schultz*	**EXHIBITS** ***Wednesday 9:00am-12:00pm***	
Wednesday August 07, 2002 2:00pm-3:20pm		WPM1P-140 **Signal Image Analysis and Speech Processing** *Chair: Mary Kohler*		***2:00pm - 2:30pm*** **INVITED TALK: Telecom Infrastructure Issues** Mathew Oommen, ***Optical Datacom***
BREAK			***BREAK ROOM***	
Wednesday August 07, 2002 3:40pm-5:00pm		WPM2P-140 **Microwave & Optical Systems and Synthesizers** *Chair: Chia-Ming Lu*		

Time	Room 209	Room 211	Room 213	Room 214	Room 216
Monday August 05, 2002 8:00am-12:00pm					
Monday August 05, 2002 2:00pm-3:20pm	MPM1L-209 **Amplifiers I** *Chair: Mark Schlarmann*	MPM1L-211 **RF & Microwave Oscillators I** *Chair: Yumin Zhang*	MPM1L-213 **Oversampled Data Conversion I** *Chair: TBD TBD*	MPM1L-214 **VLSI Power, Noise and Simulation I** *Chair: Peter-Michael Seidel*	MPM1L-216 **VLSI Testing I** *Chair: Mona Zaghloul*
BREAK					
Monday August 05, 2002 3:40pm-5:00pm	MPM2L-209 **Amplifiers II** *Chair: Mark Schlarmann*	MPM2L-211 **RF & Microwave Oscillators II** *Chair: Yumin Zhang*	MPM2L-213 **Oversampled Data Conversion II** *Chair: Kwong Chao*	MPM2L-214 **VLSI Power, Noise and Simulation II** *Chair: Peter-Michael Seidel*	MPM2L-216 **VLSI Testing II** *Chair: Mona Zaghloul*
Tuesday August 06, 2002 8:00am-9:00am					
Tuesday August 06, 2002 9:00am-10:20am	TAM1L-209 **Amplifiers III** *Chair: Mohamad Sawan*	TAM1L-211 **RF & Microwave Oscillators III** *Chair: Jose Silva-Martinez*	TAM1L-213 **Nyquist Rate Data Conversion I** *Chair: Won Namgoong*	TAM1L-214 **IP, Embedded Cores and Systems on a Chip I** *Chair: Wael Badawy*	TAM1L-216 **VLSI Routing, Partitioning and Placement I** *Chair: Robert Reese*
BREAK					
Tuesday August 06, 2002 10:40am-12:00pm	TAM2L-209 **Current Amplifiers** *Chair: Mohamad Sawan*	TAM2L-211 **RF and Microwave Filters** *Chair: Jose Silva-Martinez*	TAM2L-213 **Nyquist Rate Data Conversion II** *Chair: Won Namgoong*	TAM2L-214 **IP, Embedded Cores and Systems on a Chip II** *Chair: Wael Badawy*	TAM2L-216 **VLSI Routing, Partitioning and Placement II** *Chair: Robert Reese*
Tuesday August 06, 2002 2:00pm-3:20pm	TPM1L-209 **Sensor Electronics** *Chair: Franco Maloberti*	TPM1L-211 **RF & Microwave Amplifiers and Mixers I** *Chair: Danny Pinckley*	TPM1L-213 **Testing and BIST I** *Chair: Degang Chen*	TPM1L-214 **Low Power Circuits and Architecture I** *Chair: Lex Akers*	TPM1L-216 **VLSI Synthesis I** *Chair: Mitch Thornton*
BREAK					
Tuesday August 06, 2002 3:40pm-5:00pm	TPM2L-209 **Image Sensors** *Chair: Franco Maloberti*	TPM2L-211 **RF & Microwave Amplifiers and Mixers II** *Chair: Danny Pinckley*	TPM2L-213 **Testing and BIST II** *Chair: Degang Chen*	TPM2L-214 **Low Power Circuits and Architecture II** *Chair: Lex Akers*	TPM2L-216 **VLSI Synthesis II** *Chair: Mitch Thornton*
Wednesday August 07, 2002 8:00am-9:00am					
Wednesday August 07, 2002 9:00am-10:20am	WAM1L-209 **Analog Filters I** *Chair: Jin Liu*	WAM1L-211 **Microwave Devices and Materials** *Chair: James West*	WAM1L-213 **Optical Circuits and Systems I** *Chair: Sherif Michael*	WAM1L-214 **Novel Circuits & Architecture** *Chair: Michael Weeks*	WAM1L-216 **VLSI and Programmable Logic Applications I** *Chair: Jeffrey Coleman*
BREAK					
Wednesday August 07, 2002 10:40am-12:00pm	WAM2L-209 **Analog Filters II** *Chair: Jin Liu*	WAM2L-211 **Passive RF and Microwave Systems** *Chair: James West*	WAM2L-213 **Optical Circuits and Systems II** *Chair: Sherif Michael*	WAM2L-214 **Third and Fourth Generation Wireless Systems** *Chair: Annamalai Annamalai*	WAM2L-216 **VLSI and Programmable Logic Applications II** *Chair: Jeffrey Coleman*
Wednesday August 07, 2002 2:00pm-3:20pm	WPM1L-209 **Analog Filters III** *Chair: TBD TBD*	WPM1L-211 **Dividers/Doublers and Prescalers** *Chair: Rick Branner*	WPM1L-213 **Clock & Data Recovery Building Blocks** *Chair: J. Silva-Martinez*	WPM1L-214 **Software Radio** *Chair: K. Srikanteswara*	WPM1L-216 **VLSI Systems, Design and Simulation** *Chair: K. Thulasiraman*
BREAK					
Wednesday August 07, 2002 3:40pm-5:00pm	WPM2L-209 **Analog Filters IV** *Chair: TBD TBD*	WPM2L-211 **References** *Chair: Rick Branner*	WPM2L-213 **Communication System Performance Analysis** *Chair: Bon-Jin Ku*	WPM2L-214 **Ultra-wideband Radio** *Chair: Mike Buehrer*	WPM2L-216 **VLSI Design for Applications** *Chair: K. Thulasiraman*

Time	Room 218	Room 219	Room 221	Room 223	Room 225
Monday August 05, 2002 8:00am-12:00pm					
Monday August 05, 2002 2:00pm-3:20pm	MPM1L-218 **Wireless Networks I** *Chair: John Metzner*	MPM1L-219 **Neural Networks with Nonlinear Dynamics I** *Chair: Damon Miller*	MPM1L-221 **Analog Signal Processing** *Chair: Paul Hasler*	MPM1L-223 **Biomedical Signal and Image Processing I** *Chair: Marios Pattichis*	MPM1L-225 **Coding for Communications** *Chair: Monique Fargues*
BREAK					
Monday August 05, 2002 3:40pm-5:00pm	MPM2L-218 **Wireless Networks II** *Chair: John Metzner*	MPM2L-219 **Neural Networks with Nonlinear Dynamics II** *Chair: Damon Miller*	MPM2L-221 **DSP in Communications** *Chair: Paul Hasler*	MPM2L-223 **Biomedical Signal and Image Processing II** *Chair: Marios Pattichis*	MPM2L-225 **Non-stationary Signal Processing** *Chair: Monique Fargues*
Tuesday August 06, 2002 8:00am-9:00am					
Tuesday August 06, 2002 9:00am-10:20am	TAM1L-218 **Ad Hoc Networks** *Chair: Mingyan Liu*	TAM1L-219 **Neural Networks for Filtering and Instrumentation** *Chair: Roger Schultz*	TAM1L-221 **Special Purpose Filter Designs** *Chair: Domenic Ho*	TAM1L-223 **Multimedia and Content Based Retrieval** *Chair: Dipti Mukherjee*	TAM1L-225 **Power Systems I** *Chair: Philip Yoon*
BREAK					
Tuesday August 06, 2002 10:40am-12:00pm	TAM2L-218 **Networking Circuits and Systems** *Chair: Mingyan Liu*	TAM2L-219 **Aerospace Applications of Modeling, Control and Neural Networks** *Chair: Mark Motter*	TAM2L-221 **Detection and Enhancement** *Chair: Domenic Ho*	TAM2L-223 **Image and Video Coding** *Chair: Edward Delp*	TAM2L-225 **Power Systems II** *Chair: Philip Yoon*
Tuesday August 06, 2002 2:00pm-3:20pm	TPM1L-218 **Advanced Networking Systems I** *Chair: Bon-Jin Ku*	TPM1L-219 **Applications of Adaptive Systems I** *Chair: Edward Wilson*	TPM1L-221 **Mixed Signal & Signal Conversion Processing I** *Chair: J. Bruce*	TPM1L-223 **Signal and Image Analysis I** *Chair: Joe Havlicek*	TPM1L-225 **Power Electronics I** *Chair: Kaveh Ashenayi*
BREAK					
Tuesday August 06, 2002 3:40pm-5:00pm	TPM2L-218 **Advanced Networking Systems II** *Chair: Bon-Jin Ku*	TPM2L-219 **Applications of Adaptive Systems II** *Chair: Edward Wilson*	TPM2L-221 **Mixed Signal & Signal Conversion Processing II** *Chair: J. Bruce*	TPM2L-223 **Signal and Image Analysis II** *Chair: Joe Havlicek*	TPM2L-225 **Power Electronics II** *Chair: Kaveh Ashenayi*
Wednesday August 07, 2002 8:00am-9:00am					
Wednesday August 07, 2002 9:00am-10:20am	WAM1L-218 **Adaptive Methods in Wireless Communication Systems I** *Chair: Robert Soni*	WAM1L-219 **Neuro Control** *Chair: Mohammad Menhaj*	WAM1L-221 **Adaptive Signal and Image Processing I** *Chair: Guoliang Fan*	WAM1L-223 **Speech Processing and Analysis** *Chair: Mary Kohler*	WAM1L-225 **MPLS, MPLambdaS, and GMPLS Networks I** *Chair: Harleen Chhabra*
BREAK					
Wednesday August 07, 2002 10:40am-12:00pm	WAM2L-218 **Adaptive Methods in Wireless Communication Systems II** *Chair: Robert Soni*	WAM2L-219 **Programmable Logic Circuits** *Chair: Monte Tull*	WAM2L-221 **Adaptive Signal and Image Processing II** *Chair: Guoliang Fan*	WAM2L-223 **Watermarking and Coding** *Chair: Edward Delp*	WAM2L-225 **MPLS, MPLambdaS, and GMPLS Networks II** *Chair: Harleen Chhabra*
Wednesday August 07, 2002 2:00pm-3:20pm	WPM1L-218 **High Data Rate Modulation and Coding Techniques I** *Chair: Matt Valenti*	WPM1L-219 **High Performance Arithmetic Circuits Architectures I** *Chair: Mohamad Farooq*	WPM1L-221 **Adaptive IIR Filtering** *Chair: Neeraj Magotra*	WPM1L-223 **Low Sensitivity Digital Filter Designs** *Chair: Domenic Ho*	WPM1L-225 **Network Security I** *Chair: Raymond Garcia*
BREAK					
Wednesday August 07, 2002 3:40pm-5:00pm	WPM2L-218 **High Data Rate Modulation and Coding Techniques II** *Chair: Matt Valenti*	WPM2L-219 **High Performance Arithmetic Circuits Architectures II** *Chair: Mohamad Farooq*	WPM2L-221 **Adaptive Signal Processing Applications** *Chair: Victor DeBrunner*	WPM2L-223 **Multidimensional Filter Designs** *Chair: Domenic Ho*	WPM2L-225 **Network Security II** *Chair: Raymond Garcia*

VOLUME I

MAM0L-AUD – Student Paper Contest
Chair: Rick Branner
University of California Davis

VOLUME II

VOLUME III

WAM2L-221 -- Adaptive Signal and Image Processing II
Chair: Guoliang Fan
Oklahoma State University

WAM2L-223 -- Watermarking and Coding
Chair: Edward Delp
Purdue University

WAM2L-225 -- MPLS, MPLambdaS, and GMPLS Networks II
Chair: Harleen Chhabra
ExxonMobil

WPM1P-140 -- Signal Image Analysis and Speech Processing
Chair: Mary Kohler
Department of Defense