Wireless Communications

June 9-11, 2004

Virginia Polytechnic Institute and State University
Donaldson Brown Hotel and Conference Center • Blacksburg, Virginia

Sponsored by Virginia Tech's
Mobile and Portable Radio Research Group

Virginia Polytechnic Institute & State University

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Symposium Highlights

On June 9-11, 2004, MPRG will host its Fourteenth Annual Symposium on Wireless Personal Communications. Researchers and business leaders from around the world will gather on the Virginia Tech campus to share their latest research, theories, and techniques in wireless communications.

Major highlights of this year’s symposium will feature tutorials on cutting-edge topics and well-known luncheon speakers who are experts in their field of wireless research.

Wednesday, June 9, will open the symposium with a full-day tutorial on the innovative revision of the 3rd generation wireless system CDMA2000, titled “High Rate Data Communications Using CDMA 2000 1xEV-DO and 1xEV-DO.” 1xEV-DO and 1xEV-DV are two alternative extensions to the CDMA2000 family that present a new step forward beyond current 3rd generation wireless systems. Both of these two alternatives significantly enhance the ability of CDMA2000 1x to support seamless multimedia communication through high data rates. CDMA2000 networks in Korea, Brazil, Japan, and North America have already been upgraded to 1xEV-DO, and implementations of 1xEV-DV are proceeding rapidly. This tutorial will provide an overview of the principles underlying these standards, including basic concepts underlying 1xEV-DO and 1xEV-DV, integration of these concepts into the IS-856 and IS-2000 standards, other advanced high data rate communications concepts that have been added to these standards, and simulation results. This tutorial will be led by Stein Lundby with Qualcomm. Stein has been leading Qualcomm’s research team in designing and standardizing 1xEV-DV forward and reverse links. Qualcomm is best known as the company that pioneered CDMA technology which is used worldwide. An expanded break will separate the morning and afternoon sessions of this tutorial. The registration fee for this tutorial will include handout materials and refreshment breaks. Lunch will not be provided. However, attendees are encouraged to dine at the conference center or visit one of the many cafes or restaurants within walking distance of the center.

Wednesday evening will be a time of relaxing and socializing with colleagues and friends during a reception from 6:00-9:00 PM at the conference center. Thursday morning will kick off the technical presentations and poster sessions, which will conclude early on Friday afternoon. These presentations will feature technical papers presented in the areas of software radio platforms, networking and protocols, antenna systems, navigation and location, modulation, coding, and signal processing, and wireless applications. An expanded poster session including academic and industrial presentations will allow one-on-one technical discussions of recent advances in the field of wireless.

Thursday’s luncheon speaker will be Dr. Alan Gatherer with Texas Instruments. Dr. Gatherer is responsible for all strategic development of TI’s digital baseband modems for 3G wireless infrastructure. He will speak on the general industry direction. Plans are underway for a Thursday afternoon tour of Virginia Tech’s supercomputer. The National Science Foundation recently ranked the supercomputer as the 3rd fastest computer in the world, and the fastest at any university. As always, we look forward to the symposium party on Thursday evening.

Speaking during Friday’s luncheon will be Mr. Wayne Ward with Nextel Communications. Mr. Ward has extensive experience in product development and product management in data communications and telecommunications, as well as wireless data services and applications. He will give a brief overview of the results of the Nextel/Flaron trials in North Carolina.

At the conclusion of the technical sessions on Friday, Dr. Luiz DaSilva will lead the tutorial “Push-to-Talk Technologies (PTT).” Though public safety employees and taxi dispatchers have long realized the utility of instantaneous wireless connectivity using PTT technologies, such technologies have only recently become available to the mass-market consumer. Nextel’s Direct-Connect service has been a market leader, but with the advent of third generation systems, implementation of PTT services over PCS systems is becoming a reality. Verizon Wireless and Sprint PCS are both rolling out nationwide PTT services, with other carriers close behind. This tutorial will discuss the present and future directions for PTT services, including developing a basic understanding of the mechanisms for implementing PTT over GSM, WCDMA, and cdma2000. Particular emphasis will be placed on opportunities to reduce latency, and emerging applications that make use of PTT. Registration for this tutorial will include handout materials and a refreshment break.

Also on Friday afternoon, MPRG will host an informal laboratory Open House from 2:00-4:00 PM. So make plans to stay and tour the MPRG labs and visit with the faculty, staff, and students. Our students will be looking forward to sharing their research with you, and the faculty and staff will be delighted to meet each of you personally.

Make your reservations early to be a part of this year’s symposium. We look forward to hosting you at Virginia Tech this June!
Program Schedule

Wednesday, June 9, 2004

7:00 AM – 2:00 PM  Registration

8:00 – 11:00 AM  Tutorial – Part 1 - "High Rate Data Communications Using CDMA 2000 1xEV-DO and 1xEV-DV"  Mr. Stein Lundby, Qualcomm

11:30 AM – 1:30 PM  MPRG Industrial Affiliate Board Meeting  
(Closed session to board members. By invitation only)

2:00 – 5:00 PM  Tutorial – Part 2 - "High Rate Data Communications Using CDMA 2000 1xEV-DO and 1xEV-DV"  Mr. Stein Lundby, Qualcomm

6:00 – 9:00 PM  Reception

Thursday, June 10, 2004

7:00 – 8:00 AM  Breakfast Buffet in Commonwealth Dining Room

7:00 – 9:00 AM  Registration

8:30 AM  Introduction and Welcome: Donaldson Brown Auditorium  
Dr. Jeffrey H. Reed, Deputy Director, MPRG

SESSION I – SOFTWARE RADIO PLATFORMS
Session Chair: Dr. Jeffrey H. Reed

8:40 – 9:00 AM  Texas Instruments TCI Platform: A Cost Effective Programmable Basestation Modem  
Alan Gatherer, USA

9:00 – 9:20 AM  Mapping Efficiency of Common Radio Waveforms to Heterogeneous Hardware Structures  
Bob Plunket and Sharad Sambhani, USA

9:20 – 9:40 AM  A Discussion of Design Concepts for Wideband Digital Receiving Systems with Multiple Processing Threads  
Donald H. Steinbrecher, USA

9:40 – 10:30 AM  Refreshment Break/Poster Session/Exhibits

SESSION II – NETWORKING AND PROTOCOLS
Session Chair: Dr. R. Michael Buehrer

10:30 – 10:50 AM  Cross-Layer Interactions: A Framework for Adaptable Communications  
Jack L. Burbank and Ross E. Conklin, USA

10:50 – 11:10 AM  Cross-layer Protocols Optimized for Real-Time Multimedia Services in Energy-Constrained Mobile Ad Hoc Networks  
William S. Horton, USA

11:10 – 11:30 AM  Dynamic Spectrum Sharing Methods for Cellular Radio Systems  
Kozue Haramoto, Satoru Fukumoto, Hitoshi Yoshino, and Narumi Umeda, JAPAN

12:00 – 1:15 PM  Lunch in Commonwealth Dining Room  
Speaker: Dr. Alan Gatherer, Texas Instruments

SESSION III – ANTENNA SYSTEMS
Session Chair: Dr. William A. Davis

1:30 – 1:50 PM  A Reconfigurable Platform for MIMO Research – Real Time Implementation of 4x4 Adaptive Multi-Variate DFE  
Shyh-hao Kuo, James A. Dowle, and I. V. McLaughlin, NEW ZEALAND

1:50 – 2:10 PM  A Low Complexity Adaptive Channel Tracking Algorithm for Mobile OFDM-MIMO Applications  
Steve Gifford, John E. Kleider, and Scott Chuprun, USA

2:10 – 2:30 PM  Antenna Systems for JTRS Integration into Mobile Military Platforms  
William G. Newhall and Ray Lovestead, USA

2:30 – 2:50 PM  Nonlinear Codebook Based Channel Estimation for Computational Efficiency in Multi-Antenna Wireless Systems  
Ian Vince McLaughlin, Kishore Mehrrotra, and Shyh-Hao Kuo, NEW ZEALAND

2:50 – 3:30 PM  Refreshment Break/Poster Session/Exhibits

SESSION IV – NAVIGATION AND LOCATION
Session Chair: Dr. Wayne A. Scales

3:30 – 3:50 PM  TOA Ranging: Theory and Performance  
Dennis McCrady, Timothy Dempsey, Jeff Durre, Marc Marborana, Todd Mulholland, and Don Rasmussen, USA

3:50 – 4:10 PM  SGR Test-Bed for Integrated Navigation Applications  
Frank Carpenter, USA

4:30 – 5:30 PM  Tour – Virginia Tech's Super Computer

6:00 PM  Party Time!!
SESSION VI – WIRELESS APPLICATIONS
Session Chair: Dr. Annamalai Annamalai

10:40 – 11:00 AM  Ultra Wideband Communications in Hostile Channels: Methods for Jamming and Signal Detection
Jack L. Burbank and William T. Kasch, USA

11:00 – 11:20 AM  Transmitting Data from Bioluminescent Bioreporter Integrated Circuits (BBIC) Using Wireless Media
Nazmul Islam, Mo Zhang, and Syed K. Islam, USA

11:20 – 11:40 AM  Suppression of NB Interference in SS Systems via Adaptation and Double Matching Technique
Jozef Pawelec, POLAND

11:40 AM – 1:00 PM  Lunch in Commonwealth Dining Room
Speaker: Mr. Wayne Ward, Nextel Communications, Inc.

1:00 – 4:00 PM  Tutorial – “Push-to-Talk Technologies (PTT)”
Dr. Luiz DaSilva, Virginia Tech

2:00 – 4:00 PM  MPRG Open House and Lab Tours

4:00 PM  Conclusion

Location & Lodging
The symposium will be held on the campus of Virginia Tech at the Donaldson Brown Hotel and Conference Center.

Blacksburg is southwest of Roanoke, Virginia, on U.S. 460. Route 460 is reached by Interstate 81, Exit 118B (U.S. 460W, VA Tech) at Christiansburg, Virginia. Follow 460 West for approximately 8 miles to the Prices Fork-Downtown Exit. Stay on Prices Fork until it intersects Main Street. Turn right onto Main Street, and then turn right at the second light onto College Avenue. The Center is located in downtown Blacksburg two blocks off Main Street at the corner of College Avenue and Otey Street. Convenient guest parking is available for conference participants. A shuttle bus will be available to provide transportation between the Conference Center and local hotels.

A block of discounted lodging rooms ($77.00 per night plus tax) is being held at the Donaldson Brown Hotel for your convenience. To make reservations, please call the hotel at (540) 231-5156 or fax to (540) 231-3746. Be sure to mention the name of the symposium when making your reservations. Lodging reservations for the Donaldson Brown Hotel must be made by May 9, 2004. Lodging accommodations may be acquired at other local hotels including: BEST WESTERN RED LION INN, (540) 552-7770; FOUR POINTS SHERATON, (540) 552-7001; and AMERI SUITES, (540) 552-5636. However, lodging discounts will only be applicable at the conference center.

Exhibitor
If you are interested in having an exhibit at the symposium, please contact Jenny Frank via e-mail at mprg@vt.edu.