

WTS 2004

Wireless Telecommunications Symposium 2004

May 14 - 15, 2004



**California State Polytechnic University,
Pomona**

Kellogg West Conference Center

WELCOME TO WTS 2004

Welcome to Wireless Telecommunications Symposium 2004. Now in its third year the Wireless Telecommunications Symposium has become an internationally recognized forum for industry, government, and the academic community to exchange information related to advances in mobile communications and wireless networking. We hope that you find WTS 2004 to be an informative and enjoyable experience.

The Wireless Telecommunications Symposium recognizes the multi-faceted and multi-disciplinary nature of wireless telecommunications and networking. This is reflected by the diverse program, which includes topics in technology, applications, management, policy, and security; the multi-disciplinary group of professional organizations lending technical support to the conference: the IEEE Communications Society, INFORMS Telecommunications Section and ACM SIGMOBILE; and the varied backgrounds of the Program Committee's members.

WTS 2004 marks the first time that the Wireless Telecommunications Symposium has invited the submission of applied research papers in wireless communications for presentation and publication. We would like to thank all the authors who submitted papers for their interest in the symposium. We also wish to thank the many reviewers from industrial and academic institutions for their very helpful and informative reviews.

Special thanks go to the distinguished group of invited speakers from the federal government and the wireless telecommunications industry. We are very grateful to these leaders and experts for making time available to speak at WTS 2004. We are also grateful to the following organizations for their WTS 2004 contributions and support: Cal Poly Pomona's College of Business, College of Engineering, Computer Information Systems Department, Engineering Technology Department, Electrical and Computer Engineering Department, and Computer Science Department; SWIFT - Cal Poly Pomona's IEEE Communications Society student chapter; Lockheed-Martin; QUALCOMM; SBC Communications; Microsoft; the IEEE Foothill Section; the IEEE Communications Society's Foothill, Los Angeles, and Orange County chapters; the IEEE Foothill AP/MTT Chapter; and IEE Publishing.

Finally, we would like to thank the members of the WTS 2004 Program Committee and Operations Committee for their hard work in organizing and running this conference.

On behalf of the WTS 2004 Committee -- Welcome to WTS 2004!

Dr. Steven Powell and Dr. Lyle McCurdy
Co-Chairs, WTS Committee

Thursday, May 13	
6:00 pm to 9:30 pm	Registration
7:00 pm to 9:30 pm	Welcoming Reception
Friday, May 14	
8:00 am to 9:15 am	Registration and Continental Breakfast
9:15 am to 9:30 am	Opening remarks
9:30 am to 10:30 am	Keynote Speaker - John Muleta, Chief of the Wireless Telecommunications Bureau, Federal Communications Commission "The Benefits of Moore's Law: Expanded Spectrum Access and What Do We Do When We Get There!"
10:30 am to 10:45 am	Networking Break
10:45 am to 11:30 am	Richard J. Lynch, Executive Vice President - Chief Technical Officer, Verizon Wireless "Defining the Future of the Network"
11:30 am to 12:15 pm	Chris Rice, Executive Vice President and CTO, SBC Communications Inc. "Going Beyond Mobility: Wireless for Today and Tomorrow"
12:15 pm to 2:00 pm	Lunch and WTS 2004 Co-Sponsor Recognition
2:00 pm to 2:45 pm	Dr. Michael Zastrocky, Vice President and Research Director, Gartner "Higher Ed IT Issues: Where Does Wireless Fit"

Friday, May 14

2:45 pm to 3:45 pm	Networking Break and Poster Session
3:45 pm to 4:30 pm	Robert Kellison, Supervisory Special Agent - Cyber Branch, Federal Bureau of Investigation "Cyber Crime and the FBI"
4:30 pm to 5:00 pm	Free Time
5:00 pm to 6:00 pm	Bus travel to the Richard Nixon Library and Birthplace
6:30 pm to 10:00 pm	Richard Nixon Library and Birthplace Reception and Tour
6:30 pm to 8:00 pm	Refreshments and Tour
8:00 pm to 8:15 pm	Opening Remarks - Dr. Michael Ortiz, President Cal Poly Pomona
8:00 pm to 9:00 pm	Dinner
9:00 pm to 10:00 pm	Keynote Speaker - Michael Gallagher, Acting Assistant Secretary of Commerce for Communications and Information, Administrator of the National Telecommunications and Information Administration "From President Richard Nixon to President George W. Bush: The Rising Importance of Communications Technology and Trade in the 21st Century"
10:00 pm to 11:00 pm	Bus travel to the Kellogg West Conference Center

Saturday, May 15

8:00 am to 9:00 am	Continental Breakfast
9:00 am to 10:00 am	Wireless Network Security Tutorial - Dr. James Smith, Computer Scientist - Cyber Branch, Federal Bureau of Investigation
10:00 am to 10:15 am	Networking Break
10:15 am to 12:15 pm	Panel Discussion and Presentations - Future Directions in Wireless Telecommunications Research. Moderator: Dr. Keith Chugg, Associate Professor, University of Southern California Dr. George Rittenhouse, Vice President - Wireless Research, Bell Laboratories "The Future of Wireless Communications: Making the Internet Mobile" Dr. Gang Wu, Senior Vice-President and Executive Director, NTT DoCoMo Labs (USA) "Broadband Packet Wireless Access for Systems Beyond IMT-2000" Ilkka Niva, Director, Systems Research and Standardization, Nokia "3G Evolution, Interplay, and Trends" Dr. Chatschik Bisdikian, Research Staff Member, IBM Research "Motivating Research in Pervasive Computing" Dr. Jeyhan Karaoguz, Senior Principal Scientist, Office of the CTO, Broadcom Corporation "Evolution of Wireless Personal Area and Local Area Networks: Challenges Ahead"

Saturday, May 15	
12:15 pm to 1:15 pm	Lunch and Student Paper Awards
1:15 pm to 3:15 pm	Accepted Paper Sessions
3:15 pm to 3:30 pm	Networking Break
3:30 pm to 5:00 pm	Accepted Paper Sessions

Accepted Paper Sessions

May 15

Kellogg West Auditorium	SESSION A1: Track 7 Security and Architecture Selection
1:15pm to 2:15pm	<p>Chair: Dr. Ward Testerman</p> <p>"A Layered Security Architecture for Corporate 802.11 Wireless Networks" Murat Erten and Emrah Tomur</p> <p>"A Trivial Denial of Service Attack on IEEE 802.11 Direct Sequence Spread Spectrum Wireless LANs" Chris Wullems, Kevin Tham, Jason Smith, and Mark Looi</p> <p>"Decentralized Access Point Selection Architecture for Wireless LAN" Yutaka Fukuda, Takamitsu Abe, and Yuji Oie</p>
Collins Wine Auditorium	SESSION B1: Track 3 Performance Analysis
1:15pm to 2:15pm	<p>Chair: Dr. Massoud Moussavi</p> <p>"Performance Analysis of a Cellular System Supporting 2 Types of Services with Different Reuse Factors Using Channel Partitioning" Ming Yang and Peter Chong</p>

Collins Wine Auditorium	SESSION B1: Track 3 Performance Analysis (Continued)
1:15pm to 2:15pm	<p>"Development and Performance Characterization of Enhanced AODV Routing for CBR and TCP Traffic" Pradeepkumar Mani and David W. Petr</p> <p>"Modeling and Performance Analysis of Mobile Communication Systems Using Adaptive Beamforming Technique" Huazhou Liu and Qing-An Zeng</p>
Kellogg West Auditorium	SESSION A2: Track 4 Modeling, Algorithms, and Simulation
2:15pm to 3:15pm	<p>Chair: Dr. JP Shim</p> <p>"A Model for Evaluating Multi-Route Routing in Ad Hoc Networks" Zafar Taha, and Xian Liu</p> <p>"Introducing Feedback Congestion Control to a Network with IEEE 802.11 Wireless LAN" Hong Zhou, Doan Hoang, P. Nhau, and V. Mirchandani</p> <p>"Performance Analysis of Energy Consumption in 3GPP Networks" Jui-Hung Yeh, Chi-Chen Lee, Jyh-Cheng Chen</p>
Collins Wine Auditorium	SESSION B2: Track 2 OFDM Systems and Track 8 Ad hoc networks
2:15pm to 3:15pm	<p>Chair: Dr. Ilir Progni</p> <p>"ML-Based Estimator for Integer Frequency Offset Estimation of OFDM systems" Chen Chen, Jiandong Li, Linjing Zhao, and Jun Niu</p> <p>"Impact of Inactivity Timer on Energy Consumption in WCDMA and cdma2000" Chi-Chen Lee, Jui-Hung Yeh, and Jyh-Cheng chen</p> <p>"Impact of Mobility on the Performance of Wireless Mobile Ad Hoc Networks" Xiao-Long Li, Dharma P. Agrawal, and Qing-An Zeng</p>

Kellogg West Auditorium	SESSION A3: Track 5 QoS and network reliability
3:30pm to 4:30pm	<p>Chair: Dr. Salam Salloum</p> <p>"A Dependence between Average Call Duration and Voice Transmission Quality: Measurement and Applications" Jan Holub, John. G. Beerends and Rad Smid</p> <p>"QoS Management in Service Specific Label Switched Wireless Networks" Maruthi Pathapati, Sridhar Gangadharpalli, and Sridhar Varadarajan</p> <p>"An Efficient Rate Adaptation Scheme in Wireless Mobile Networks" Floriano De Rango, Gianluca Aloï, and Salvatore Marano</p>
Collins Wine Auditorium	SESSION B3: Track 6 Multimedia applications
3:30pm to 4:30pm	<p>Chair: Dr. Vijay Deokar</p> <p>"A Handoff Scheme with Probability-based Channel Borrowing in Integrated Wireless Cellular Networks" Wei Li, Hang Chen, and Dharma P. Agrawal</p> <p>"Power-controlled wireless links for media streaming applications" Yan Li, and Nick Bambos</p> <p>"Middleware for Multimedia Mobile Collaborative System" Xiaoyong Su, B. S. Prabhu, Chi-Cheng Chu, and Rajit Gadh</p>

Speaker Biographies



Michael D. Gallagher was nominated by President George W. Bush on October 14, 2003 to be Assistant Secretary of Commerce for Communications and Information and Administrator of the National Telecommunications and Information Administration, the Executive Branch agency which is the President's principal adviser on telecommunications and information policy issues. In addition to representing the Executive Branch in both domestic and international telecommunications and information policy activities, the NTIA manages the Federal use of the spectrum; administers infrastructure grants to support the development of a national information infrastructure accessible to all Americans; manages public telecommunications facilities grants designed to maintain and extend the public broadcasting infrastructure; and performs cutting-edge telecommunications research and engineering, including resolving technical telecommunications issues for the Federal government and private sector. Mr. Gallagher serves as the Acting Assistant Secretary and NTIA's Acting Administrator pending Senate action on the nomination.



John Muleta is Chief of the Federal Communications Commission's Wireless Telecommunications Bureau (WTB), which handles all FCC domestic wireless telecommunications programs and policies-- except those involving satellite communications or broadcasting-- including licensing, enforcement, and regulatory functions. Wireless communications services include cellular telephone, paging, personal communications services, public safety, and other commercial and private radio services. The Bureau is also responsible for implementing the FCC's statutory authority to assign spectrum licenses by competitive bidding. FCC Chairman Michael K. Powell appointed Mr. Muleta to this position in January 2003.



Christopher T. Rice is Executive Vice President – Services; Chief Technology Officer at SBC Communications Inc. As Executive Vice President-Services and Chief Technology Officer, Chris Rice oversees Network Planning and Engineering, SBC Laboratories, Inc. and Procurement. His responsibilities also include overseeing the development and deployment of advanced access, switching, and routing technologies for the company. Prior to being appointed to his current position in March 2004, he served as Senior Vice President-Network Planning and Engineering. In that position he was responsible for SBC enterprise-wide technology direction, new technology introduction, platform development, network engineering, network planning, and network regulation.



Richard Lynch, Executive Vice President and Chief Technical Officer, Verizon Wireless, the largest wireless carrier in the U.S. is responsible for the performance of the company's coast-to-coast multibillion-dollar wireless voice and data network covering more than two million square-miles. Under his leadership, Verizon Wireless launched

Express Network -- the fastest national 3G high-speed wireless network delivering dial-up speeds in mobile environments.



Dr. George Rittenhouse is Vice President of Wireless Research, Bell Laboratories. Dr. Rittenhouse heads several projects, including MIMO system development, network optimization, wireless IP networks, and fourth generation wireless. In 2001 he received the Bell Labs Fellow award.

Dr. Rittenhouse is active on several national policy and standards boards, working with FCC and Homeland Security subgroups on the scientific side of wireless in the post 9/11 era. He has numerous publications and patents in the areas of wireless systems and circuits.

Dr. Michael Zastrocky is a Vice President and Research Director at Gartner Research, where he specializes in higher education, including distributed learning/e-learning, administrative computing issues, academic computing on campus, networking and telecommunications, and strategic planning. He is also a trustee for several higher education institutions.

Dr. Gang Wu is a Senior Vice President and Executive Director at NTT DoCoMo Labs (USA), where he has been engaged in the research of hyper operators for next generation wireless networks and 4G mobile communication systems. Prior research at the Ministry of Posts and Telecommunications, Japan, included involvement in R&D projects related to broadband mobile communication systems in the microwave band, ultra-high-speed wireless LANs in the millimeter-wave band, broadband wireless access systems using stratospheric platforms, and MIRAI for seamless integration of heterogeneous wireless networks. Dr. Wu has been heavily involved in IEEE 802 standardization activities and is serving as a Procedural Vice Chair of the IEEE 802.20 Working Group for Mobile Broadband Wireless Access systems. He has been active as an IEEE conference organizer and is an Editor of the Journal of Wireless Communications and Mobile Computing (WCWC) and a Guest Editor of the IEICE Transactions on Communications. He has authored over 80 reviewed publications.

Ilkka Niva is a Research and Standards Director at Nokia (San Diego), where he is heading CDMA Standards, 3G and beyond Research, and various programs for next generation wireless Mobility. He is responsible for university relations and is a member of the Board for the UCSD Center for Wireless Communications. In addition, he is coordinating the funding of a multi-million dollar research project. He joined Nokia Mobile Phones in 1988 (Finland) and has experience on the very first GSM, TDMA, IS-95 and WCDMA technologies and related life cycles, 3G roadmapping and strategic technology planning.



Dr. Chatschik Bisdikian is a Research Staff Member with IBM's T. J. Watson Research Center, Hawthorne, NY. He has worked on the development and analysis of communications protocols for personal, local, and metropolitan area networks; he is currently focusing on pervasive communications and computing. During his career, Dr. Bisdikian has authored over 90 peer-reviewed papers in the above mentioned areas, had 7 patents issued, co-authored the book *Bluetooth Revealed* (Prentice Hall), and served on several conference program committees. He has served as a Vice-Chair of the IEEE 802.15.1 task group that developed the IEEE personal area networks standard adapted from the Bluetooth wireless technology. Dr. Bisdikian is an IEEE Fellow for contributions to the development, modeling, and analysis of communication protocols and wireless personal area networks.

Dr. Jeyhan Karaoguz is a Senior Principal Scientist in the Office of the CTO at Broadcom Corporation, where he is leading the technology development efforts in next generation wireless personal area networks (WPAN). Over the past three years he has made key contributions to the IEEE 802.15.3 High Rate WPAN Standard and served as the assistant editor for the physical layer specification of the standard.



Dr. Keith Chugg is an Associate Professor in the EE-Systems Dept. at USC, where he is a co-director of the Communication Sciences Institute. Dr. Chugg is co-author of the book *Iterative Detection: Adaptivity, Complexity Reduction, and Applications* and is a co-founder of TrellisWare Technologies, Inc., where he currently serves as Chief Scientist. He has been active in the IEEE as a Globecom conference organizer and as Associate Editor for Signal Processing and Iterative Detection, IEEE Transactions on Communications. His research interests are in signaling, detection, and estimation for digital communication and data storage systems.

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Contributors



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SWIFT (Students With an Interest in the Future of Telecommunications) is Cal Poly Pomona's student branch chapter of the IEEE Communications Society. SWIFT is chartered by the College of Business and open to all Cal Poly Pomona students interested in telecommunications and networking. SWIFT was created in 1990 with the objective of enhancing and enriching the students' learning experience and preparing students for careers in the telecommunications and networking industry. Some of the ways in which SWIFT attempts to achieve this objective include: inviting speakers to Cal Poly to discuss the latest technologies, industry practices, and career trends; co-hosting telecommunications and networking seminars and symposia; holding "hands-on" workshops; and hosting social events.