

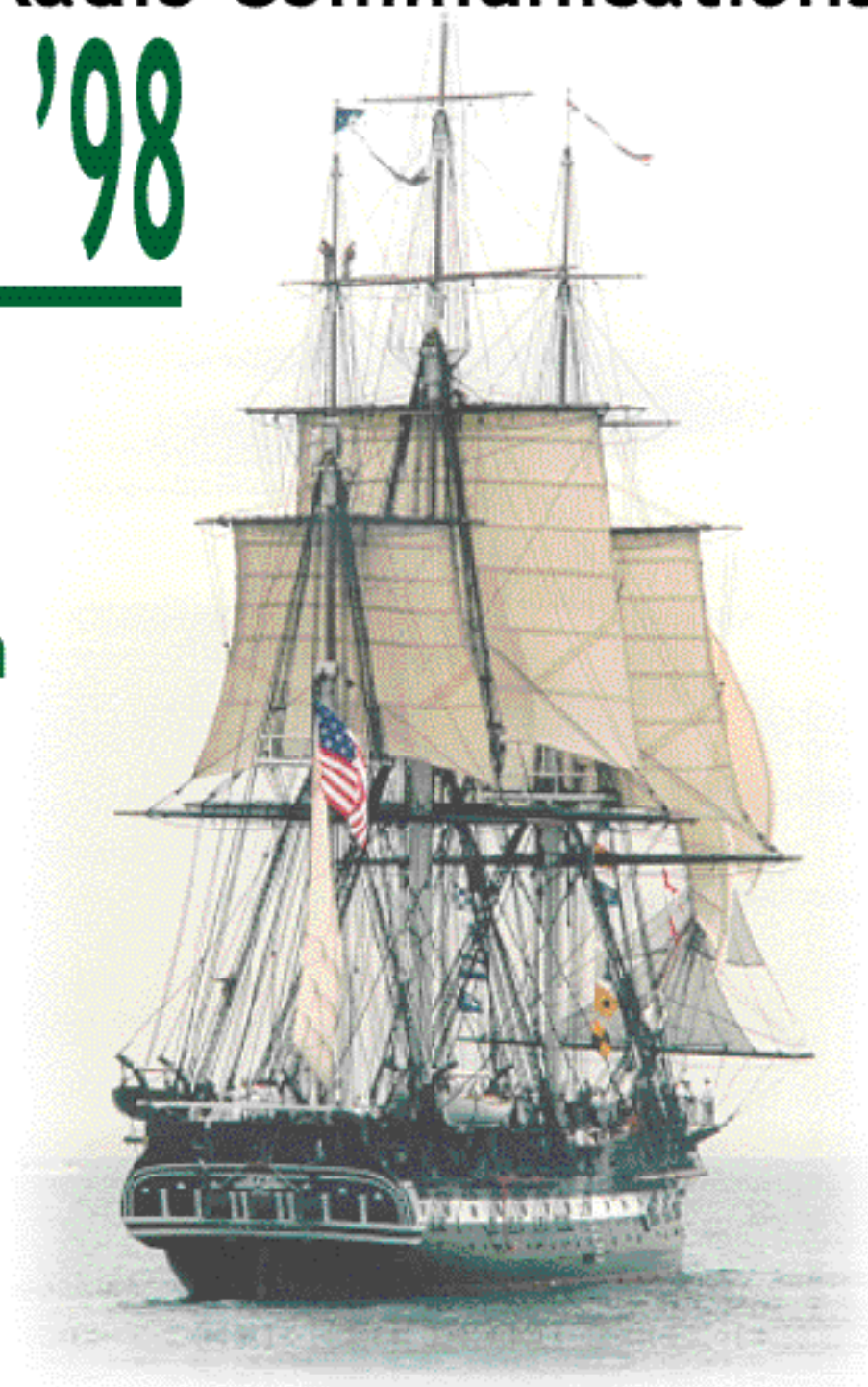
The Ninth IEEE International Symposium on



Personal, Indoor and Mobile Radio Communications

PIMRC '98

Final Program



Marriott Copley Place • Boston, Massachusetts, USA • September 8–11, 1998



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Greetings from the Governor of Massachusetts



I am pleased to extend warm greetings as you gather for the Ninth IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC '98), to be held in Boston, Massachusetts, on September 8–11, 1998.

This year's conference is expected to draw more than six hundred researchers from academia, industry, and government; senior executives

of telecommunications companies; managers; and engineers from more than 40 different countries. I applaud the outstanding efforts of the participants, who share an uncompromising commitment to excellence, and commend the dedication of the members of IEEE who make this event possible.

Best wishes for an exciting and enjoyable event.

Argeo Paul Cellucci
Governor of Massachusetts

Greetings from the Mayor of Boston



I send you my sincerest welcome as you gather from around the world for the Ninth IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC '98).

You picked the perfect city. Boston's many universities and growing technology sector make us a world leader in the field. This symposium represents an important opportunity for professional development and the exchange of information in an important field of communications technology.

Boston is also renowned for our historic and charming neighborhoods, our inviting parks and waterfront walkways, and our wide selection of eateries—from four-star restaurants to cozy corner pubs. I invite you to explore our city—so friendly to pedestrians it's known as "America's Walking City"—and uncover some of its many treasures.

You have my wishes for a very successful and productive symposium and, again, I welcome you to Boston. I send you my best regards.

Thomas M. Menino
Mayor of Boston



Greetings from the General Chairman



It is my honor and pleasure to welcome you to Boston for the Ninth IEEE International Symposium on Personal, Indoor and Mobile Radio Communications.

It is appropriate that your symposium is in the United States this year. It follows a year which witnessed an explosion of competition in wireless communications. The United States now has over 56 million wireless communications customers who can choose from up to eight providers of wireless services in their market. Right here in Boston there are six companies from

which customers can choose to purchase their wireless service. This unprecedented level of wireless competition is prompting technical and marketing innovation. The wireless providers in Boston, for instance, are using a variety of technologies to deliver services to customers. Customers can choose from service offerings that use CDMA-800, CDMA-1900, TDMA, ETDMA, GSM, and analog.

Customers know that competition has arrived, and they recognize that new features, lower costs per minute, and cheaper phones will soon follow. Customers have told us that they want calling party pays, location technology services, wireless data, wireless local loop, and bundled services.

Our greatest challenge is to understand exactly what customers want in order to make the right technology decisions. This symposium is a terrific opportunity for the discussion of which technologies will help the industry meet and anticipate future customer demands that will enable wireless communications growth to continue.

While you are here, please take some time to experience Boston. The city is rich in history and is home to more than 70 colleges and universities and some of the best restaurants and shopping areas in America.

On behalf of the Organizing Committee, I warmly welcome you to PIMRC '98 in historic Boston, Massachusetts.

Dennis F. Strigl
General Chairman of PIMRC '98

Greetings from the Organizer and Technical Program Chairman



The occasion of the Ninth IEEE International Symposium on Personal, Indoor and Mobile Radio Communications marks its second occurrence in the United States. In keeping with its history of global diversity in participants and sponsorships, PIMRC '98 offers an outstanding program of technical papers, tutorials, invited lectures, and panel discussions that reflect the truly global view of emerging third-generation wireless networks in the mobile life of the third millennium. As always, we have tried to strike a balance between the

diverse interests of academia and industry, both in the composition of the organizing committee and in the technical content of the program. We have also tried to address issues of interest to designers, manufacturers, and service providers.

The first day of the conference offers tutorials that will provide participants with an opportunity to broaden their understanding of the industry so that they are better prepared to appreciate the

depth of the technical program that will be presented during the following three days.

The second day of the conference will begin with an executive panel discussion addressing the future of the industry from the point of view of senior executives of service providers, consumer products companies, electronic device manufacturers, and regulatory organizations. After this, research results will be presented in parallel technical sessions. Invited papers will begin several of these sessions. The conference also includes three more panels in which the future of technology and marketing will be discussed by leaders in the field. These technical papers and panels describe the latest research, development, and new concepts in various aspects of wireless information networks.

To encourage young researchers, the symposium has allocated several prizes for selected papers written and presented by students.

We are sure that our strong technical program and the charm and attraction of historic Boston will create an enjoyable experience for all participants in the conference.

Kaveh Pahlavan
Organizer and Technical Program Chairman



Executive Panel

Wednesday, September 9, 8:30 a.m.

PIMRC '98 will open on Wednesday, September 9, 1998, with an **Executive Panel**. In this panel, each of our distinguished guests will give a brief presentation and then the floor will be open for discussion. This event replaces the traditional keynote speech commonly given at other major international conferences. The panelists and the subjects of their presentations are as follows:



Dennis F. Strigl, President and CEO of Bell Atlantic Mobile and one of the most prominent architects in the wireless communications industry, is the moderator and the leader of this panel. Strigl's experience provides a unique vantage point: from launching the nation's first cellular telephone network and managing two of the largest cellular mergers in the industry, to today leading one of the world's

preeminent wireless portfolios, with domestic operations in 19 states and international investments spanning Latin America, Europe, and the Pacific Rim. Strigl has held many

important positions, including the presidency of Ameritech Mobile Communications, where he was instrumental in launching the nation's first cellular telephone network. In addition, Strigl was the recipient of the Achievement Award for Outstanding Leadership at the Fourth Annual Cellular Telecommunications Industry Association (CTIA) Conference. The Cellular Telecommunications Industry Association also recognized Strigl as an important contributor to the wireless industry by appointing him chairman of its Board of Directors for 1996–1997. Strigl has provided expert commentary on building an industry and on the wireless evolution for several leading business publications and broadcast talk shows. Strigl has also addressed business audiences at the National Association of Business Economists, the Association for Corporate Growth, the Radio Club of America, and The Conference Board.



Robert Verrue will address the past, present, and future of wireless communications from the viewpoint of the European research community. He will emphasize issues concerning the new trends in research under the umbrella of the European Commission and their impact on the extremely successful European cellular industry. Verrue is the Director General DG XIII: Telecommunications, Information

Market and Exploitation of Research of the European Commission. Before assuming this position, Verrue held several

other important positions in the European Commission, including Deputy Director General for External Affairs; Director General for Industrial Affairs and Internal Market; and Division Head for Economic and Financial Affairs. In these positions, he was responsible for relations with central European countries, CIS republics, and other European countries; coordination of monetary policies, and borrowing and lending policies; and problems related to the steel sector. Verrue was born in France in November 1947. He attended the École Supérieure de Commerce et d'Administration des Entreprises, Lille, France; and the College of Europe—International Economics Section, Bruges, Belgium. He also earned an MBA from the European Institute of Business Administration (INSEAD), Fontainebleau, France.



Chi-Kuo Mao will discuss trends in the mobile and wireless communications industry in the Republic of China and in the Far East. Mao is the Vice Minister of Transportation and Telecommunications for the Republic of China, responsible for telecommunications and post affairs of the Ministry. His major contributions include reform of the telecommunications regulatory regime and programming of the concession process for mobile

and fixed-line services. He also played a key role in the amendment process of the Telecommunication Act, the DGT Status, and the Chunghwa Telecom Corporate Status, which were all passed in January of 1996. Before joining the Ministry as Secretary General in 1987, Mao was a professor of management at the National Chiao-Tung University in Hsinchu. He is a member of the National Information Infrastructure (NII) Program Committee, the Chunghwa Telecom Board of Directors, and the Yangming Marine Transportation Board of Directors. Mao received a BS degree from National Cheng-Kung University; an MSE degree from the Asian Institute of Technology, Bangkok, Thailand; and a PhD degree from the Massachusetts Institute of Technology.



Tom Rowbotham will present his view of trends in the mobile and wireless communications industry in Europe. Rowbotham has been the Director of Technology at British Telecom since 1995, where his responsibilities include all research and standards activity for the corporation. Prior to assuming this position, Rowbotham held several other important positions, including Senior Vice President of Product Development and Engineering at Concert, the joint venture company formed by BT

and MCI; and Director of BT Laboratories, with responsibility for 3,000 graduate engineers working on telecommunications R&D, located mainly in the UK but with centers in the US and Australia. Rowbotham has just completed a lead technology assignment for BT in connection with the recently announced alliance with AT&T. Rowbotham received a BSc from Queen's University Belfast, an MSc in Microwave Physics from the University of Surrey, and a PhD in Modelling of Transient Phenomena from the University of Nottingham. He is a fellow of the Royal Academy of Engineering; the founding President of the TINA Consortium; a recent Vice President of the IEEE Communications Society; a Visiting Professor at King's College, University of London; and a member of the Electronics Divisional Board of the IEE.



Russ Johnsen will address the future directions of the industry from the viewpoint of a device manufacturer. He is the Vice President and General Manager of the Communications Division of Analog Devices, a silicon solutions-oriented provider of value-added semiconductor products for wireless and broadband communications. Johnsen has been with Analog Devices since 1993, when he started as Vice President and

General Manager of the Communications Division. Since then, the Communications Division has been the fastest growing organization in the company, and is now one of the largest revenue generators at ADI. Under Johnsen's leadership, Analog Devices has become a leader in software and integrated circuit solutions for wireless communications and broadband access technologies. Before joining Analog Devices, Johnsen was General Manager of the Wide Area Networks Division of National Semiconductor, where he led that company into efforts in the telecom markets and started up their development of products for wireless communications. His international experience includes the management of one of NSC's factories in Malaysia, and also the successful startup of an equipment manufacturing company in Manila, Philippines. Johnsen is a graduate of the Massachusetts Institute of Technology.

General Manager of Analog Devices' Semiconductor Division.



Technology Panels

Special Presentation

Wednesday, September 9, 12:15 p.m.–1:15 p.m.

Bluetooth

The open specification for an innovative technology, code named “Bluetooth,” is being developed through the combined contributions of members of the Bluetooth Special Interest Group (SIG). Bluetooth utilizes a short-range radio link to exchange information, enabling effortless wireless connectivity between mobile phones, mobile PCs, handheld computers, and other peripherals. The radio will operate on the globally available 2.45 GHz ISM “free band,” allowing international travelers to use Bluetooth-enabled equipment worldwide.

The Bluetooth SIG was formed in early 1998 as a result of the global commitment of the five founding companies to develop the concept toward a technology standard. By working together closely, the five companies have combined their individual specialized expertise to create Bluetooth. Ericsson contributed the basic radio technology expertise; Toshiba and IBM are developing a common specification for integrating Bluetooth technology into mobile devices; Intel is contributing its advanced chip and software expertise; and Nokia contributes expertise in radio technology and mobile handset software.

This special presentation was organized by Mahmoud Naghshineh, a member of the Bluetooth SIG. He currently manages the communication systems group at the IBM Thomas J. Watson Research Center in Yorktown Heights, New York.

Wednesday, September 9, 12:15 p.m.–1:15 p.m.

IMT-2000

The international focus and collaboration on IMT-2000 will affect the future of wireless communications well into the next millennium. An overview of leading proposals and the technical challenges to fulfill the promise of IMT-2000 and develop truly global standards accommodating regional needs will be presented. There are significant similarities among these proposals, and an ongoing harmonization process is bringing the leading proposals together. In this panel discussion, representatives of the key international bodies behind these proposals will address and debate their views on how IMT-2000 should shape and impact the future of the wireless communication industry. The moderator of

this panel is Gerry Flynn, who is co-chair of a TIA TR45 IMT-2000 Ad Hoc on harmonization. Panelists are John Marinho of Lucent Technologies; Mark Epstein of Qualcomm; and John Martin of IDO Corporation.

Thursday, September 10, 12:15 p.m.–1:15 p.m.

Future of Wireless Data Communications

The wireless data industry covers both wide area mobile data services and wireless local area networks. In the past decade, we have witnessed numerous innovative technologies and standards attracting tremendous attention. However, in spite of many optimistic predictions, a market for the wireless data industry comparable to that of the cellular phone market has yet to evolve. In this panel, representatives of different sectors of the wireless data industry will present their views on the past, present, and future of this industry. The panel will open with a talk by Tom Freeburg of Motorola, one of the most experienced wireless data architects in the industry. Other invited participants are Shuzo Kato of Mitsubishi, who will present the Japanese view of data communications; Tero Ojanperä of the Nokia Research Center, who will give the European view; Dipankar Raychaudhuri of NEC, who will address wireless ATM; and Ahmad Bahai of ALGOREX, who will address Internet applications. The moderator for this panel is Craig Mathias of the Fairpoint Group. The panel was organized by Kaveh Pahlavan of CWINS, WPI.

Thursday, September 10, 12:15 p.m.–1:15 p.m.

Radio Access for Third-Generation Mobile Systems

ETSI, ARIB, TTA, and other regional and national standards bodies are in the process of completing the definition of radio access for IMT-2000. Proposals, which were due to ITU by June 30, 1998, will be evaluated, and a final decision on whether the world will have a common radio access technology, or several, will be made by March 31, 1999. The focus of this panel will be to describe and discuss the main proposed radio access technologies, including UTRA from Europe (supported by Japan) and CDMA-2000 from North America. The possibility of a single global standard will then be debated. This panel was organized and will be moderated by Hamid Aghvami of King's College. Panelists are M. Sawahashi of NTT DOCOMO; W. Mohr of Siemens, Germany; and C. Vinodrai of Bell Mobility, Canada.



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Z. Zvonar, Analog Devices, USA



Program Schedule Overview

Registration (Third-Floor Foyer)

Tuesday: 7:30 a.m.–5:00 p.m. and 7:00 p.m.–9:00 p.m.

Wednesday: 7:30 a.m.–5:00 p.m.

Thursday: 7:30 a.m.–5:00 p.m.

Friday: 7:30 a.m.–Noon

Tuesday, September 8

9:00 a.m.–5:00 p.m.

Tutorials

- Tue-F1 Third-Generation Wireless Personal and Multimedia Communications (*Boston College*)
- Tue-F2 Wireless Local Loop (*Boston University*)
- Tue-F3 Multiple Access Protocols for Wireless and Mobile Multimedia Networks (*Brandeis*)
- Tue-F4 Migration From Second-Generation to Third-Generation Mobile Communication Systems (*Harvard*)

9:00 a.m.–Noon

- Tue-AM1 Analog-to-Digital Conversion and Digital Synthesis for Software Radios (*MIT*)
- Tue-AM2 Wireless LANs (*Northeastern*)
- Tue-AM3 Mobile and Wireless ATM Networks (*Wellesley*)
- Tue-AM4 Signal Separation in Multiuser Systems (*Tufts*)

2:00 p.m.–5:00 p.m.

Tutorials

- Tue-PM1 Integrated Solutions and Chip-Sets for Wireless Communications (*MIT*)
- Tue-PM2 Radio Propagation Characteristics in Modern Wireless Systems (*Northeastern*)
- Tue-PM3 Broadband Wireless (*Tufts*)
- Tue-PM4 Space-Time Codes (*Wellesley*)

7:00 p.m.

Conference Welcome Reception (*Third-Floor Atrium Lounge*)

Wednesday, September 9

9:30 a.m.–5:00 p.m.

Exhibits

8:30 a.m.–10:00 a.m.

Welcoming Remarks
Executive Panel (*Salon F*)

10:30 a.m.–Noon

Technical Sessions

- A1 Wireless Local Loop (*Harvard*)
- A2 Wideband Local Access (*Simmons*)
- A3 Wireless ATM I (*Brandeis*)
- A4 Deployment Tools (*MIT*)
- A5 Network Planning (*Northeastern*)
- A6 Mobile Services (*Suffolk*)
- A7 Third-Generation Systems (*Wellesley*)
- A8 Network Protocols for Wireless Applications (*Tufts*)

12:15 p.m.–1:15 p.m.

Special Presentation

- Bluetooth (*Harvard*)

Panel

- IMT-2000, an important ITU initiative to create a single global standard for digital wireless communication (*Salon F*)

2:00 p.m.–5:00 p.m.

Technical Sessions

- B1 CDMA for Third-Generation Networks (*Harvard*)
- B2 Multiuser Receivers (*Simmons*)
- B3 Wireless ATM II (*Brandeis*)
- B4 Challenges in Network Deployment (*MIT*)
- B5 Handoff (*Northeastern*)
- B6 ASIC Design for Wireless Applications (*Suffolk*)
- B7 ACTS UMTS (*Wellesley*)
- B8 Geolocation for Wireless Services (*Tufts*)

2:30 p.m.–5:00 p.m.

Advisory Committee (*Boston College*)

6:00 p.m.

Buses Leave Marriott (*Marriott Main Entrance*)

7:00 p.m.

Cruise of Boston Harbor Aboard the Odyssey



Thursday, September 10

9:30 a.m.–5:00 p.m.
Exhibits

9:00 a.m.–Noon

Tutorial

Thu–AM Universal Mobile Telecommunication System
(UMTS) (*Tufts*)

Technical Sessions

- C1 Interference Cancellation for CDMA Systems (*Harvard*)
- C2 OFDM I (*Simmons*)
- C3 Multimedia Wireless (*Brandeis*)
- C4 Indoor and Urban Radio Propagation (*MIT*)
- C5 Network Aspects (*Suffolk*)
- C6 Wireless Optical Networks (*Northeastern*)
- C7 ACTS MBS and W-LAN (*Wellesley*)

12:15 p.m.–1:15 p.m.

Panels

- Future of Wireless Data Communications (*Salon G*)
- Radio Access for Third-Generation Mobile Systems
(*Harvard*)

2:00 p.m.–5:00 p.m.

Tutorial

Thu–PM IMT-2000 Progress Report (*Tufts*)

Technical Sessions

- D1 Performance of CDMA Networks (*Harvard*)
- D2 OFDM II (*Simmons*)
- D3 Wireless Data (*Brandeis*)
- D4 Propagation Studies I / Modulation, Coding, and
Equalization I (*MIT*)
- D5 Power Control (*Northeastern*)
- D6 Smart Antennas (*Suffolk*)
- D7 ACTS System Aspects (*Wellesley*)

7:00 p.m.

Conference Banquet (*Salon F*)

Friday, September 11

8:30 a.m.–1:00 p.m.
Exhibits

9:00 a.m.–Noon

Tutorial

Fri–AM High-Speed Wireless Data for Internet Applications
(*Tufts*)

Technical Sessions

- E1 CDMA I (*Harvard*)
- E2 Modulation, Coding, and Equalization II (*Simmons*)
- E3 Medium Access Methods I (*Brandeis*)
- E4 Propagation Studies II (*MIT*)
- E5 Traffic Engineering (*Suffolk*)
- E6 Satellite Networks / TDMA (*Northeastern*)
- E7 ACTS Enabling Technologies (*Wellesley*)

12:15 p.m.–1:45 p.m.

Conference Luncheon (*Salon F*)

2:00 p.m.–5:00 p.m.

Technical Sessions

- F1 CDMA II (*Harvard*)
- F2 Modulation, Coding, and Equalization III (*Simmons*)
- F3 Medium Access Methods II (*Brandeis*)
- F4 Antenna Systems (*MIT*)
- F5 Resources Management Techniques (*Suffolk*)
- F6 Spread Spectrum (*Northeastern*)
- F7 GSM (*Wellesley*)
- F8 Security and Privacy / PCS Systems (*Tufts*)



Invited Papers

The telecommunications industry faces significant challenges as we approach the new millennium. In this increasingly competitive world, there is a need to continually evaluate the technical merits of available and emerging technologies in light of ever-changing business realities. The industry recognizes a need for a paradigm shift in the way we solve problems and seize new opportunities. In this environment, there is an overriding need to steadily improve technical efficiency and to be increasingly responsive to competition.

The PIMRC '98 invited speakers are among the most respected individuals in the telecommunications field today, and the topics they will address are highly relevant to these challenging times. Their papers will cover such diverse areas of wireless communications as wireless ATM, LMDS, third-generation systems, wireless multimedia, and mobile IP. These topics represent some of the most important challenges being faced by the industry today. The invited papers are listed below, with an indication of the technical sessions in which they are to be presented.

Session A2 — Intelligent and Flexible Radio Access/Transmission Technologies for Wireless Multimedia Communication Systems

Seiichi Sampei and Norihiko Morinaga, Osaka University

Session A3 — Current Topics in Wireless & Mobile ATM Networks: QoS Control, IP Support and Legacy Service Integration

Dipankar Raychaudhuri, NEC USA, C&C Research Laboratories

Session A5 — Third Generation Wireless Technologies — Expectations and Realities

Lin-Nan Lee, Khalid Karimullah, Feng-Wen Sun, and Mustafa Erozt, Hughes Network Systems

Session A6 — Providing Internet Services to Mobile Phones: A Case Study With Email

Thomas Y.C. Woo, Krishan K. Sabnani, and Scott C. Miller, Bell Laboratories, Lucent Technologies

Session A7 — Cluster Mobile Switching Center for Third-Generation Wireless Systems

T.F. La Porta, R. Ramjee, K. Murakami, R. Buskens, and Y.-J. Lin, Bell Laboratories, Lucent Technologies

Session A8 — Service Location Protocol for Mobile Users

Charles E. Perkins, Sun Microsystems

Session B1 — Challenges of Higher Speed Wireless Access

Ahmad R.S. Bahai, ALGOREX, Inc.

Session B6 — Integrated Circuit Technologies for Wireless Communications

Babak Daneshrad, University of California, Los Angeles

Session B7 — Perspectives on 3G System Development

Tero Ojanperä, Nokia Research Center

Session C3 — Energy Efficient Protocols for Wireless Systems

Prathima Agrawal, AT&T Laboratories

Session C6 — Amplifier Linearization for the Local Multipoint Distribution System Application

Kathleen Muhonen and Mohsen Kavehrad, Pennsylvania State University

Session C7 — Third Generation: A Unified Architecture to Provide Mobile Multimedia

Jorge M. Pereira, European Commission

Session D3 — On Tractable Wireless Channel Models

An Mei Chen and Ramesh R. Rao, University of California, San Diego

Session D7 — UMTS Universal Mobile Telecommunications System Development of Standards for the Third Generation

Antun Samukic, Ericsson Radio Systems AB

Session E2 — A Simple and Accurate Analysis of Digital Communication Systems With Diversity Reception in Different Fading Environments

A. Annamalai and V.K. Bhargava, University of Victoria; C. Tellambura, Monash University

Session F3 — Guaranteed Quality-of-Services Wireless Access to Broadband Networks

Kwang-Cheng Chen and Chia-Sheng Chang, National Taiwan University

Session F5 — Power Control for Wireless Data Based on Utility and Pricing

Viral Shah, Narayan B. Mandayam, and David J. Goodman, Rutgers University

Session F6 — Performance Analysis of mMFSK Frequency Hopping Modulation for Wireless Ad Hoc Networks

S. Glisic and A. Pouttu, University of Oulu; Z. Nikolic and N. Milosevic, University of Nis



Tutorials

Tuesday, September 8, 9:00 a.m.–5:00 p.m.

Tue–F1

Third-Generation Wireless Personal and Multimedia Communications

Ramjee Prasad, Delft University of Technology, The Netherlands

The first part of this tutorial will be an overview of wireless personal and multimedia communications, including a review of air-interface access schemes.

The second part of the tutorial will be a discussion of the latest developments in the standardization of third-generation systems, especially developments related to WCDMA in ETSI and ARIB, Wideband CDMA in TR45.5, and IS-136. High-speed data proposals for IMT-2000 will be highlighted, with the key parameters and the reasoning behind them discussed. Topics will include channel bandwidth, chip rate, channel structures, implementation of variable-bit-rate capabilities, transmission of simultaneous services (multicall), high-bit-rate packet data, and new handover schemes. In addition to the regional standards bodies, the role of the ITU-R radio transmission technologies (RTT) evaluation process in the development of third-generation air-interface standards will be discussed.

The third part of the tutorial will address the evolution of second-generation core networks such as GSM and IS-41 toward third-generation networks. New capabilities such as variable-rate packet data, multicall capabilities, and guaranteed quality of service for packet data services place new requirements on second-generation networks. The potential of second-generation networks to evolve toward third-generation networks will be presented in relation to these requirements. Specific enhancements to their protocols and interfaces will also be proposed.

Tuesday, September 8, 9:00 a.m.–5:00 p.m.

Tue–F2

Wireless Local Loop

Joe DeCamp and Lee Kuoni, Motorola, USA

The purpose of this tutorial is to provide an overview of wireless local loop (WLL) technology and systems, as well as a market overview. Evolution of WLL will be presented, followed by the state of the market and deployment status, opportunities, and forecasts. Comparison of technologies will include wireless versus wireline access, micro versus macro, cordless, cellular, and proprietary technologies. A networking deployment presentation will focus on licensing and spectrum allocation, development of the business case, engineering issues in deploying the system, and subscriber unit installation and distribution. Issues arising in the commercialization of the system include public relations, marketing and promotion, and customer care and service. Following a case study, the future of WLL will be examined in the light of new technologies and solutions.

Tuesday, September 8, 9:00 a.m.–5:00 p.m.

Tue–F3

Multiple Access Protocols for Wireless and Mobile Multimedia Networks

Krishna M. Sivalingam, Washington State University, USA

Prathima Agrawal, AT&T Laboratories, USA

Parameswaran Ramanathan, University of Wisconsin, USA

Typical Medium Access Control (MAC) protocols only coordinate access to a shared medium, in both wired and wireless networks. In future wireless and mobile multimedia networks, MAC protocols will have a significantly more complex role. MAC protocols will be primarily responsible for the allocation of bandwidth and for the coordination and scheduling of packet transmissions on a shared communication link. In contrast to MAC protocols in wireline networks, MAC protocols for wireless networks must also deal with issues such as mobility, error control, and energy conservation. Present-day MAC protocols for wireless networks are designed mainly for voice and data communication. However, the next-generation protocols are expected to provide integrated support for multimedia applications containing voice, video, and data. With the emergence of wireless local loops, MAC protocols for voice and Internet access are also receiving considerable attention.

This full-day tutorial will begin with a discussion of the evolution of MAC protocols for wireless networks. The focus will then turn to current MAC protocols for voice communication in cellular networks, data communication in cellular networks, and voice and data communication in wireless local loops. In particular, the tutorial will cover standards, techniques, and protocols such as IS-54, IS-136, GSM, ARDIS, RAM, CDPD, IEEE 802.11, and HiperLAN. Issues and solutions in the design of next-generation MAC protocols from recent papers will be discussed. Techniques for quality-of-service guarantees, energy efficiency, and error control in MAC protocols will be covered. Insights and experiences gained from testbeds such as SWAN, BARWAN, WATMnet, etc., will also be presented. Finally, there will be a brief discussion of interaction between the MAC and other protocol layers; several unresolved problems and issues in this area will be highlighted.

Tuesday, September 8, 9:00 a.m.–5:00 p.m.

Tue–F4

Migration From Second-Generation to Third-Generation Mobile Communication Systems

Hamid Aghvami, King's College, UK

This tutorial will address the various approaches being taken to meet the requirements of third-generation mobile systems (UMTS and IMT-2000). After a brief description of GSM and IS-95, migration paths from IS-95 to wideband CDMA and from GSM to UMTS air interfaces will be discussed.



A GSM-CDMA system operating within the GSM network with an IS-95 air interface has recently been introduced. It is claimed that the addition of CDMA radio access into the GSM network provides a wide range of economic and operational benefits. A field trial of the system was carried out in the UK this year. Technical aspects and the architecture of this system will be discussed.

For the first phase of UMTS, Europe has decided to adopt an evolutionary approach for the UMTS core network based on migration from the present GSM infrastructure. For the air interface, however, a revolutionary approach has been chosen. ETSI SMG2 has recently selected the wideband CDMA concept for the paired spectrum band (FDD mode) and the TD/CDMA concept for the unpaired spectrum band (TDD mode) for UMTS Terrestrial Radio Access (UTRA). The technical and operational aspects of these concepts will be described and discussed.

Tuesday, September 8, 9:00 a.m.–Noon
Tue–AM1

Analog-to-Digital Conversion and Digital Signal Synthesis for Software Radios

Brian D. Woerner and Jeffrey H. Reed, Virginia Tech, USA

As commercial wireless communications services grow more varied and numerous, there is a strong need for radios which flexibly adapt to multiple requirements for air interfaces, frequency bands, bandwidth, and quality of service. Continuing advances in digital signal processing have enabled implementation of increasing amounts of radio functionality as flexible signal processing operations controlled by software. This long trend has inspired the popular notion of a “software radio.”

The transition between digital and analog signals is central to any notion of software radio. For the foreseeable future, this transition will occur at intermediate frequencies. At the transmitter, modulated signals are generated using direct digital synthesis technologies, before RF processing. At the receiver, incoming down-converted signals are sampled and digitized at intermediate frequencies. This half-day tutorial will focus on the two key operations of digital signal synthesis and analog-to-digital conversion.

Tuesday, September 8, 9:00 a.m.–Noon
Tue–AM2

Wireless LANs

Craig Mathias, Fairpoint Group, USA

Wireless LANs are an often overlooked element of the wireless data landscape, but one with a strong market presence and a clear set of both vertical and horizontal applications. Wireless LAN technology forms the basis of a broad range of products, from data collection to office applications to metropolitan-area bridges. This

tutorial is designed for those familiar with the basics of wireless communications and LAN technology, but not necessarily with wireless LANs. The tutorial will begin with a review of the core issues in wireless data communications, and will then examine the major tradeoffs in wireless LAN design. This will include a review of spread-spectrum communications. Key applications will be looked at, and a number of products will be examined in some depth, covering the major technology choices and discussing the advantages and disadvantages of each. Finally, key technology and product trends will be examined, including speculations about a number of exciting potential applications for wireless LANs.

Tuesday, September 8, 9:00 a.m.–Noon
Tue–AM3

Mobile and Wireless ATM Networks

Guy Omidar, GTE-Telecom, Egypt

In the early 1990s, several institutions began to work on extension of ATM into wireless networks. The challenge was to extend ATM capabilities into wireless media—the media that do not recognize the kind of quality of service promised by ATM. Through the years, there has been an increase in the number of contributions to major conferences by experts in this field. ATM technology and its access to wireless networks will be widely deployed over the next decade. Integration of portable wireless access and mobility features into wired-ATM networks can present a cost-effective and efficient way to provide seamless end-to-end connectivity in a market where demands on wireless networks have grown rapidly and have been predicted to generate billions of dollars in revenue by the end of the century. The deployment of broadband cell-based technologies and their integration with emerging wireless access networks are expected to become increasingly important. Although wired ATM is moving rapidly toward becoming the technology of choice, the area of wireless ATM is an emerging technology that still has many issues that need to be resolved. The areas for immediate consideration in mobile and wireless ATM are mobility and connection management, location management, connection establishment, handover and handoff algorithms, quality-of-service provisioning, interworking of wireless ATM with wireline, and wireless ATM standardization and implementation. Another area of interest is multiple access techniques to carry ATM traffic. This year the successful launching of the low orbit (LEO) Iridium satellites has initiated the first mobile LEO satellite communications network. Global personal communications services will be attractive for those countries that otherwise could not provide terrestrial links in a cost-effective manner. The new GEO satellite network will provide digital television broadcasting and high data voice channel transmission for future use. Some are suggesting that wireless ATM could be present onboard satellites, and work is also in progress to make ATM survivable. Researchers are actively involved in designing



mobile and wireless algorithms, and they have learned from past experience how to introduce mobility features (mobility features will also be discussed in this tutorial).

Tuesday, September 8, 9:00 a.m.–Noon

Tue–AM4

Signal Separation in Multiuser Systems

Yeheskel Bar-Ness, New Jersey Institute of Technology, USA

Frequency reuse has become important in many communication systems. Most users are sharing the same frequency bandwidth by implementing code, polarization, or other distinguishing orthogonal properties of signals. Signal multiplexing methods are used in dually polarized satellites and terrestrial microwave links, overlapping frequency bands for constant modulus modulation systems, and mobile and personal indoor and outdoor communications. Clearly the performance of these systems depends largely on co-channel interference. Particularly for the non-stationary fading environment, adaptive cancelers are needed. In this tutorial, methods of adaptive signal separation, such as cross-coupled PLL, constant modulus separators, and cross-polarization cancelers, will be reviewed. New methods of adaptive interference cancellation for multiuser code-division multiple-access (CDMA) will be presented.

Tuesday, September 8, 2:00 p.m.–5:00 p.m.

Tue–PM1

Integrated Solutions and Chip-Sets for Wireless Communications

Christian Kermarrec and Frederic Boutaud, Analog Devices, USA

This tutorial will address issues associated with implementation of wireless communication systems using highly integrated solutions such as specialized chip-sets. System partitioning of wireless systems will be presented based on its current technology status. Major factors relevant to radio-frequency (RF) integrated circuit (IC) design will be addressed, including radio transceiver architecture based on optimal system and chip partitioning, as well as optimal use of software techniques; semiconductor technology for optimal performance, cost, and integration path; and circuit implementation based on requirements of wireless systems. Examples of integrated RF chip-sets for different standards will be presented.

Mixed signal presents an enabling technology for modern digital implementations. Different architectural approaches to the design of analog-to-digital and digital-to-analog converters will be outlined, together with major system-level requirements for wireless applications. Some of the transceiver architectures based on wideband conversion technologies will be presented, and state-of-the-art components for wireless design will be summarized.

Ingredients for the development of wireless communication baseband VLSI circuits will include digital CMOS technology, design tradeoffs based on system requirements and technology constraints, and signal processing technology. A review of the main characteristics and associated metrics is proposed. Evolution and future trends will be discussed. The impact of wireless-specific standards on DSP and baseband processors will be presented, with selected chip-set realizations illustrating major trends.

Tuesday, September 8, 2:00 p.m.–5:00 p.m.

Tue–PM2

Radio Propagation Characteristics in Modern Wireless Systems

Henry Bertoni, Polytechnic University of Brooklyn, USA

The characteristics of the radio channel in urban environments place severe constraints on wireless system performance. System design and installation require a familiarity with the observed characteristics and an understanding of the physical mechanisms and environmental features that give rise to them. This tutorial will review the results obtained in various channel measurements for both narrowband and pulsed excitation. The basic physical processes of propagation, reflection and transmission, diffraction, and scattering will be reviewed. The tutorial will discuss how these basic processes can be used to understand the influence of the urban environment on the observed channel properties and to construct propagation prediction models. The theory behind generic building of environment models, such as COST 231, and site-specific models will be discussed. Emphasis will be placed on relating predicted behavior to relevant measurements, and on identifying areas in which there is currently a lack of theoretical understanding.

This tutorial is intended for technical workers with a limited background in wave propagation, such as an undergraduate course in electromagnetics, who wish to achieve a deeper understanding of the wireless radio channel.

Tuesday, September 8, 2:00 p.m.–5:00 p.m.

Tue–PM3

Broadband Wireless

Tom Freeburg, Motorola, USA

This tutorial will address different applications, including wireless LANs, multimedia access in the local loop, backbone carriage, existing CLECs, and peer networks. Characteristics of frequency bands for the operation of broadband wireless will be presented, with an overview of the RF environment, path loss indoors and outdoors, the basics of multipath propagation, and the techniques to overcome it (equalization, multicarrier, smart antennas). The technology overview will include a discussion of modulation methods, radio implementation, transmitter and



receiver architectures, and integration approaches. Selected topics from the following standards groups will be presented: the ATM Forum, IEEE 802.11, ARIB, ETSI (HiperLAN, Bran, Daws), and the HomeBus Consortium.

Tuesday, September 8, 2:00 p.m.–5:00 p.m.

Tue–PM4

Space-Time Codes

A.R. Calderbank, Ayman Naguib, Nambi Seshadri, and
Vahid Tarokh, AT&T Laboratories, USA

Physical limitations on wireless channels present a fundamental technical challenge to reliable communication. Bandwidth limitations, propagation loss, noise, interference, and multipath fading make the wireless channel a narrow pipe that does not readily accommodate rapid flow of data. Deploying multiple antennas at both transmitter and receiver increases the capacity of wireless channels, and the standard approach to realizing this capacity is linear processing at the receiver. By contrast, transmit diversity schemes use processing at the transmitter to spread information across the antennas. This tutorial describes space-time codes, a new coding paradigm in which signal processing at the receiver is combined with coding techniques appropriate to multiple transmit antennas. With only two antennas at the transmitter and receiver, it is possible to design systems in which the reliability / throughput far exceeds systems in use today.

Thursday, September 10, 9:00 a.m.–Noon

Thu–AM

Universal Mobile Telecommunication System (UMTS)

Philippe Lucas, Cegetel, France

In Europe, third-generation mobile systems are known as UMTS (the Universal Mobile Telecommunication System) and have been standardized by the European Telecommunications Standards Institute (ETSI). It is expected that UMTS will be commercially available in 2002 and will reach mass-market for mobile multimedia applications in 2005. The first phase of UMTS is characterized by the provision of actual services such as speech, SMS, and fax, and by the extension of fixed services such as Internet / intranet access, e-commerce, and video-conferencing applied to the mobile environment. In addition, the concept of the Virtual Home Environment allowing users to exploit their own sets of services irrespective of the network or the access part will be an essential UMTS feature. In a second phase, UMTS will be characterized by the ability to use services on any access means (cellular, cordless, fixed, satellite) connected to a unified core network. In order to achieve this goal, the core network targeted for UMTS should have a clear split between the access systems and the core network part. Europe and Japan have agreed to achieve this by an evolution of the GSM core network. This requires some evolution of actual GSM

capabilities. In particular, GSM should be able to switch services with bandwidth greater than 64 kb/s; provide variable-bit-rate services to optimize the usage of spectrum and guarantee quality of service; and provide mechanisms to implement Virtual Home Environment features. In addition, UMTS addresses specific spectrum and therefore requires a new radio access system able to transmit up to 2 Mb/s depending on the usage.

Thursday, September 10, 2:00 p.m.–5:00 p.m.

Thu–PM

IMT-2000: Wireless Into the Next Millennium

John Marinho, Lucent Technologies, USA

At the turn of the century, the world population of wireless subscribers will exceed one-half billion. Industry growth continues to outpace projections, particularly in the Asia / Pacific and Latin American regions of the world. The demand for new services to support data, the Internet, and advanced image and video applications are driving the establishment of new standards and technologies to provide for higher bandwidth and increased throughput in wireless networks. These standards and technologies are being proposed by various regions to the ITU under the umbrella of IMT-2000, which is scheduled for completion by the end of 1999. Based on these developments, it may be reasonable to expect that in the next millennium, wireless will become the preferred medium of access to telecommunications services and networks on a global scale.

Friday, September 11, 9:00 a.m.–Noon

Fri–AM

High-Speed Wireless Data for Internet Applications

Justin Chuang, AT&T Laboratories, USA

Cellular radio services have been extremely successful in providing untethered voice communications. With the advent of new personal communications services, wireless access is expected to become even more popular. However, wireless data services have captured only a limited market share so far. One obstacle for wireless data services is their limited capability in both technology and applications. On the other hand, personal computers and Internet services have experienced explosive growth during the past three years due to low-cost, high-performance computer technologies and attractive network applications. The popularity of the World Wide Web is further accelerating market penetration. It is timely to consider a synergistic combination of wireless, computer, and Internet technologies to provide Advanced Cellular Internet Services (ACIS) using a wide-area cellular network for ubiquitous information access.

There appears to be a proven market for popular applications such as Web browsing and information exchange over the Internet. A major barrier is a cellular network's capability to transport



bandwidth high enough to meet the needs of these applications. Existing wireless data rates, up to several tens of kilobits, may be over one order of magnitude short of what is required to make popular applications user-friendly.

Among the many challenging tasks of wireless information networking there exist two fundamental limits imposed by the radio channel: transmission bandwidth limitation caused by multipath propagation; and co-channel interference caused by frequency reuse. The first part of this tutorial will outline two design methodologies to overcome these limitations: signal processing techniques which counter fading and interference in the physical layer; and multiple access techniques which improve system performance through radio resource management. Implementation of these techniques in existing systems and standards, including wireless LAN, wireless data networks, and

second-generation data services, is reviewed in the second part of the tutorial. In the third part of the tutorial, these technologies will be applied in designing high-speed wireless data networks for emerging applications such as Internet Web browsing. An introduction to traffic models and a discussion of emerging third-generation approaches will also be included.

Key technologies used in Enhanced Data for GSM Evolution and an OFDM-Based ACIS System will be discussed. The first system employs link adaptation with adaptive modulation/coding schemes and fixed frequency reuse. The second system proposes a Dynamic Packet Assignment for resource allocation and uses OFDM and smart antennas, with possible link adaptation for the physical layer. CDMA with multicode for data applications will also be discussed briefly.



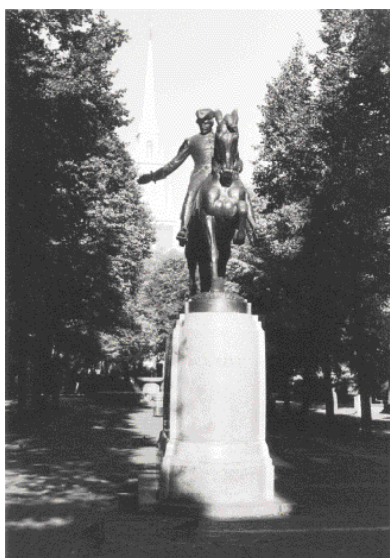
Conference Arrangements

Registration Information

The Registration Desk at the Marriott Copley Place will be open as follows:

- | | |
|--------------------------|--|
| • Tuesday, September 8 | 7:30 a.m.–5:00 p.m.
7:00 p.m.–9:00 p.m. |
| • Wednesday, September 9 | 7:30 a.m.–5:00 p.m. |
| • Thursday, September 10 | 7:30 a.m.–5:00 p.m. |
| • Friday, September 11 | 7:30 a.m.–Noon |

All conference participants must check in at the Registration Desk. Your conference identification badge and other important conference materials will be distributed at registration.



About Boston

Known as America's Walking City, Boston is also the historical, educational, and cultural center of the Northeast. From Beacon Hill's maze of narrow, cobblestoned walkways, to downtown's soaring skyscrapers and jam-packed streets, to the waterfront's rambling wharf buildings, Boston is both eclectic and charming.

In early September, the weather in Boston should be just perfect for exploring the city on foot.

The conference hotel, the Marriott Copley Place, is located in the heart of Boston's historic Back Bay, within walking distance of the Boston Public Gardens; the theater district; upscale boutiques, restaurants, and galleries; and many of the city's most popular attractions.

Visit the campus of one of Boston's many colleges and universities. Spend some time at the Museum of Science or the Museum of Fine Arts. Walk the Freedom Trail. Tour the JFK Memorial Library. Experience Quincy Market. Take full advantage of all that PIMRC '98 has to offer, but also take some time to see why Boston is one of the most popular conference venues in the United States.

For more information on Boston, see these Web sites:

- <http://www.boston.com>
- <http://www.boston.yahoo.com>
- <http://www.bostonusa.com>
- <http://www.boston-online.com>
- <http://www.massport.com/logan/logan.html>



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Marriott Copley Place

The Marriott Copley Place, located in Boston's fashionable Back Bay, has beautiful guest rooms, your choice of six restaurants, a full-service health club, and everything you'll need to be comfortable during your visit to Boston for PIMRC '98.

The Marriott is part of the Boston Convention Complex, which includes more than 200 shops, restaurants, and cafes—all connected by climate-controlled walkways.

Transportation

The Marriott Copley Place is fewer than 5 miles from Logan International Airport. Commercial limousines, taxis, and the nearby Boston subway system all provide transportation between the Marriott and the airport.

- Taxi: Taxi fare from the airport to the Marriott Copley Place is approximately \$18.
- Bus service: Several services are available, including City Transportation (617-561-9000), which picks up at all terminals (outside baggage claim at the bus stand) on the hour and half hour from 6:30 a.m. to 11:00 p.m. Fare one way is \$7.50.
- Public transportation: Take shuttle bus number 22 or 33 from terminal to MBTA subway station. Fare is \$0.85.

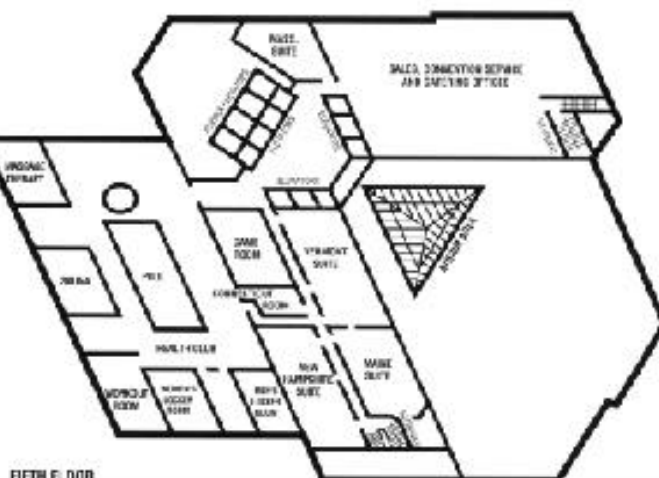
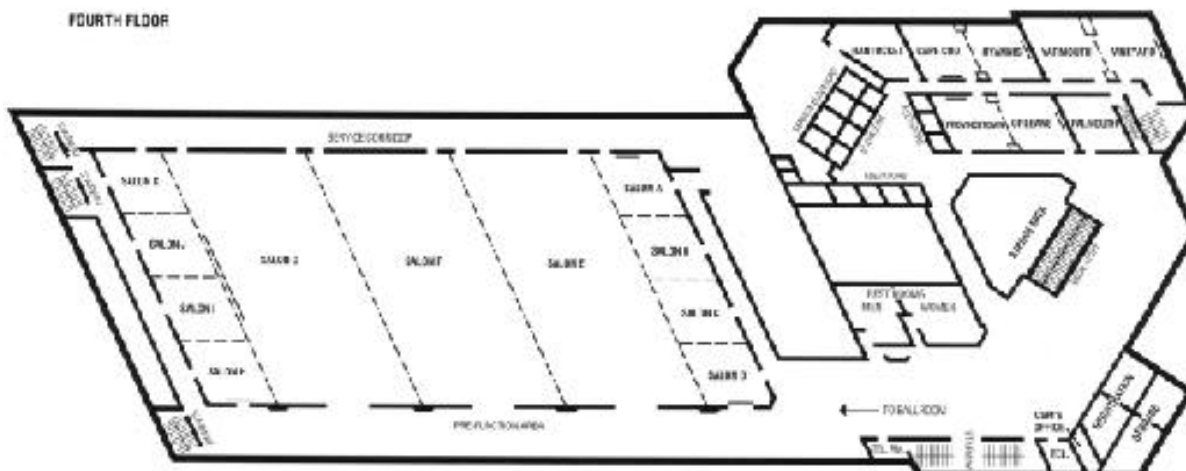


Hotel Floorplan

THIRD FLOOR



FOURTH FLOOR



FIFTH FLOOR



Social Events

Tuesday, September 8, 7:00 p.m.
Conference Welcome Reception
(Included with full conference registration)

Sponsored by



Wednesday, September 9, 7:00 p.m.
Cruise of Boston Harbor
(Separate registration is required)

Sponsored by



Thursday, September 10, 7:00 p.m.
Conference Banquet
(Included with full conference registration)

Sponsored by



Friday, September 11, 12:15 p.m.
Conference Luncheon
(Included with full conference registration)

Sponsored by





Technical Session Overview

Wednesday, September 9 — Morning

A1 Wireless Local Loop Chair: Lee Kuoni	A2 Wideband Local Access Chair: Pierre Chevillat	A3 Wireless ATM I Chair: C.-K. Toh	A4 Deployment Tools Chair: Reinaldo Valenzuela
Mitigating Interference in Wireless Local Loop DS-CDMA Systems J.E. Smee, H.C. Huang Forward Link Soft-Handoff Gain of IS-95 CDMA System for Wireless Local Loop Networks A. Aksu, W. Biagini, H. Stellakis ASIC Implementation of a High Efficiency CDMA Receiver for a High Data Rate WLL System I. Oppermann, N. Weste Capacity of a Wireless Local Loop Network Based on GSM T. Klingenbrunn, P. Mogensen	Intelligent and Flexible Radio Access/Transmission Technologies for Wireless Multimedia Communication Systems S. Sampei, N. Morinaga <i>(Invited Paper)</i> Broadband Radio Access Integrated Network (BRAIN) in MM-Wave Band: Indoor Wireless LAN Prototype G. Wu, Y. Hase, M. Inoue Development and Evaluation on the Millimeter-Wave Indoor Wireless LAN Demonstrators A. Kato, T. Manabe, T. Ihara, M. Fujise Frequency-Offset Invariant Equaliser for Broadband Wireless Networks A.E. Jones, R. Perry	Current Topics in Wireless & Mobile ATM Networks: QoS Control, IP Support and Legacy Service Integration D. Raychaudhuri <i>(Invited Paper)</i> A Pseudo-Bayesian Aloha Algorithm With Mixed Priorities for Wireless ATM J.-F. Frigon, V.C.M. Leung An Experimental Architecture for Providing QoS Guarantees in Mobile Networks Using RSVP I. Mahadevan, K.M. Sivalingam Fair Queueing Wireless ATM MAC Protocols R. Sigle, T. Renger	Multi-Cell Coverage Predictions: A Massively Parallel Approach Based on the ParFlow Method B. Chopard, P. Luthi, J.-F. Wagen Site-Specific Wideband and Narrowband Modeling of Indoor Radio Channel Using Ray-Tracing M. Hassan-Ali, K. Pahlavan Statistical Optimization of a Slope UTD Model for the Determination of Coverage Zones Y. Pousset, R. Vauzelle Planning Indoor Wireless Communication System M.-L. Dai
A5 Network Planning Chair: Hamid Aghvami	A6 Mobile Services Chair: Tero Ojanperä	A7 Third-Generation Systems Chair: Li Fung Chang	A8 Network Protocols for Wireless Applications Chair: Victor Bahl
Third Generation Wireless Technologies — Expectations and Realities L.-N. Lee, K. Karimullah, F.-W. Sun, M. Eroo <i>(Invited Paper)</i> Optimisation of Micro Cellular Regions by Minimising the Number of Base Stations D. Kristic, L.M. Correia Cost-Effective Selection of Radio Access Ports in Dense Wireless Systems R.A. Stanley, A.H. Levesque Outage Probability of CDMA-TDD Micro Cells in a CDMA-FDD Environment H. Haas, G.J.R. Povey	Providing Internet Services to Mobile Phones: A Case Study With Email T.Y.C. Woo, K.K. Sabnani, S.C. Miller <i>(Invited Paper)</i> Overview and Capacity of the GPRS (General Packet Radio Service) C. Ferrer, M. Oliver Performance Analysis of a Hybrid ARQ for IP Packet Transmission in Fading Channel A.R. Prasad, K. Seki Battery Power Sensitive Video Processing in Wireless Networks P. Agrawal, J.-C. Chen, S. Kishore, P. Ramanathan, K. Sivalingam	Cluster Mobile Switching Center for Third Generation Wireless Systems T.F. La Porta, R. Ramjee, K. Murakami, R. Buskens, Y.-J. Lin <i>(Invited Paper)</i> Authentication Schemes for Third Generation Mobile Radio Systems S. Pütz, R. Schmitz, F. Tönsing Performance Analysis of a Multilink Packet Access for Next Generation Wireless Cellular Systems B. Jabbari, E.H. Dinan, W. Fuhrmann The Realistic Network Evolution Towards Third Generation Mobile Communications N. Lobley, A. Clapton, S. Dutnall	Service Location Protocol for Mobile Users C.E. Perkins <i>(Invited Paper)</i> A Medium Access Protocol for Wireless LANs Which Supports Isochronous and Asynchronous Traffic C. Romans, J. Tourrilhes Power Efficient MAC Protocol for Multihop Radio Networks S. Singh, C.S. Raghavendra Fast Collision Resolution With SDMA for the DSA++ MAC-Protocol for Wireless ATM Networks U. Vornefeld, E. Weltersbach



Wednesday, September 9 — Afternoon

B1 CDMA for Third-Generation Networks

Chair: Savo Glisic

Challenges of Higher Speed Wireless Access

A.R.S. Bahai (*Invited Paper*)

On the Capacity of TDMA and CDMA for Broadband Wireless Packet Access

S.V. Krishnamurthy,
A.S. Acampora, M. Zorzi

Downlink OFDM Techniques in 3rd Generation TDMA Based Mobile Systems

J.P. Castro, E. Hallmann, H. Rohling

CDMA Packet Transmission Control in the Third Generation Mobile Communications System

M. Nagatsuka, Y. Ishikawa,
J. Hagiwara, T. Nakamura, S. Onoe

Radio Resource Knapsack Packing for WCDMA Air Interface

J. Laakso, R. Jäntti, M. Rinne,
O. Salonaho

Link Capacity Analysis of a Wideband CDMA System

P. Xie, H. Sugimoto

A Study on Bi-Orthogonal Modulation for W-CDMA Higher Bit Rate Transmission

H. Murai, N. Voyer, T. Fujino

Performance of a Common Channel Packet Access in WCDMA

F. Khan, C. Roobol, J. Larsson

B2 Multiuser Receivers

Chair: Jorma Lilleberg

Semi-Blind Decorrelating Multi- User Detectors for CDMA: Subspace Methods

A. Høst-Madsen

Novel Iterative Multiuser Receiver for Asynchronous CDMA Systems in Rayleigh Fading Channels

W. Haifeng, J. Lilleberg

Iterative Multiuser Detection for Convolutionally Coded Asynchronous DS-CDMA

M.C. Valenti, B.D. Woerner

Noncoherent Equalization for Multipulse Modulation

M.K. Varanasi

MMSE Multiuser Detection for Asynchronous Dual-Rate Direct Sequence CDMA Communications

S. Buzzi, M. Lops, A.M. Tulino

Performance Evaluation of the Decorrelating Detector for DS-CDMA Systems Over Multi- Path Rayleigh Fading Channels With AWGN

A.J. Voorman, D. Koulakiotis,
A.H. Aghvami, R. Prasad

Performance Analysis of an Adaptive MLSE Diversity Receiver for Multiuser DS-CDMA in Fading Channel

M. Asvial, I. Sasase

Linear Space-Time Multiuser Receivers for Wireless CDMA Systems

H. Huang, C. Papadimas

B3 Wireless ATM II

**Chair:
Dipankar Raychaudhuri**

On Scheduling of Multimedia Services in a Low-Power MAC for Wireless ATM Networks

J.-Y. Chen, K.M. Sivalingam,
P. Agrawal, R. Acharya

Guaranteed QoS Access by Packet- by-Packet Generalized Processor Sharing With Channel Errors and Long Propagation

C.-S. Chang, K.-C. Chen

Impact of Burst Errors on Framing

M. Zorzi, R.R. Rao

A New Distributed and Dynamic Call Admission Policy for Mobile Wireless Networks With QoS Guarantee

S. Wu, K.Y.M. Wong, B. Li

A Performance Comparison of Media Synchronization Schemes for Collaborative Systems in an Interconnected ATM-Wireless LAN

Y. Ishibashi, S. Tasaka, T. Takeo

Wireless ATM: Handover Issues

F. Jiang, T. Käkölä

Dual QoS Loading Algorithms for Multicarrier Systems Offering Different CBR Services

L.M.C. Hoo, J. Tellado, J.M. Cioffi

On the Transmission of ATM Traffic in Wide Area Cellular Networks

R. Morera, J. Dunlop

B4 Challenges in Network Deployment

**Chair and Organizer:
Rajamani Ganesh**

Traffic Analysis of Partially Overlaid AMPS/IS-136 Systems

R. Ramésh, K. Balachandran

Analysis of Diversity Performance of Space Diversity and Cross Polarization for PCS Base Stations

J. Weitzen, M. Wallace

Impact of Cell Size on Dual-Mode CDMA Cellular Networks

R. Ganesh, H. Stellakis

Deployment of Multi-Layer TDMA Cellular Network With Distributed Coverage for Traffic Capacity Enhancement

J. Brouet, P. Charrière, V. Kumar,
A. Wautier, J. Antoine

CDMA Downlink Performance Issues

R. Walton, M. Wallace, S. Howard

Science, Engineering and Art of Cellular Network Deployment

S. Faruque

Radio Coverage Optimization With Genetic Algorithms

K. Lieska, E. Laitinen,
J. Lähteenmäki



Wednesday, September 9 — Afternoon

B5 Handoff

Chair: Justin Chuang

Unified Handoff Control Protocol for Dynamic Path Rerouting in Mobile ATM Networks
J. Li, D. Raychaudhuri, R. Yates

A General Formula for Handoff Rate in PCS Networks
Y. Fang, I. Chlamtac, Y.-B. Lin

A Handoff Algorithm for Wireless Systems Using Pattern Recognition
R. Narasimhan, D.C. Cox

Shadow Margin, Overlapping and Transceivers per Cell When Making Handovers With Hysteresis Margin
A. Rojas, J. Paradells

A Stochastic Rerouting Mechanism for Handoff in Mobile ATM Networks
M. Kang, M. Jung, S. Lee

Determining Velocity Threshold for Handoff Control in Hierarchically Structured Networks
J.S. Kim, W.G. Chung, H.J. Choi, J.M. Cheong, S. Park

Handoff Protocols in JD-CDMA
J. Mayer, J. Schlee, T. Weber

Accurate Performance Analysis of Hard Handoff Algorithms
R. Prakash, V. Veeravalli

B6 ASIC Design for Wireless Applications

Chair: Zoran Zvonar

Integrated Circuit Technologies for Wireless Communications
B. Daneshrad (*Invited Paper*)

Testing the Double Low-IF Receiver Architecture
V. Boccuzzi, J. Glas

Implementation Aspects for Noncoherent Tracking Based on a Time-Discrete Delay-Locked Loop
H. Olson, H. Tenhunen

Performance of Phase-Locked Loop Receiver in Digital FM Systems
T. Ekvetchavit, Z. Zvonar

New Results on the Effects of Nonlinear Amplifiers on DQPSK and $\pi/4$ -DQPSK Signals
S. Hischke, J. Habermann

Hardware Implementation Aspects of a Detector Based on Successive Interference Cancellation in a DS/CDMA System
T. Olsson, C.M. Jönsson, V. Öwall, P. Nilsson

CCD Matched Filter in Spread Spectrum Communication
E. Nishimori, C. Kimura, A. Nakagawa, K. Tsubouchi

A Low-Complexity Multiuser Detector for Asynchronous CDMA QPSK Systems
E. Del Re, R. Fantacci, S. Morosi, G. Vivaldi

B7 ACTS UMTS

**Chair and Organizer:
Jorge Pereira**

Perspectives on 3G System Development
T. Ojanperä (*Invited Paper*)

CDMA With Multiuser Detection vs. Coding
A. Correia, F. Cercas, A. Rodrigues

Inter-Layer Resource Management for Hierarchical Cell Structures
G. Noubir

Locally Centralized Dynamic Resource Allocation Algorithm for the UMTS in Manhattan Environment
C. Mihailescu, X. Lagrange, Ph. Godlewski

A Concept for Hybrid Random/Dynamic Radio Resource Management
M. Berg

The RAINBOW Concept for the UMTS Access Network
P. Díaz, G. Fleming, J. Nelson, J. De Vriendt, E. Berruto

A Proposal of a New MAC Layer for FMA 1
L.J.M. Carrera, J. Nijhof, R. Prasad

Multiple Slot Allocation for Voice/Data Transmission Over PRMA++ Applied to FRAMES Multiple Access Mode 1
R. Ferrús, P. Díaz

B8 Geolocation for Wireless Services

Chair: Joseph Pisano

Radio Propagation Modelling for Indoor Geolocation Applications
P. Krishnamurthy, K. Pahlavan, J. Beneat

Time of Arrival Estimation of Narrowband TDMA Signals for Mobile Positioning
S. Fischer, H. Grubeck, A. Kangas, H. Koorapaty, E. Larsson, P. Lundqvist

Mobile Phone Location in Dedicated and Idle Modes
V. Ruutu, M. Alanen, G. Gunnarsson, T. Rantalainen, V.-M. Teittinen

A Selective Model to Suppress NLOS Signals in Angle-of-Arrival (AOA) Location Estimation
L. Xiong

Angular Dependency of Line-of-Sight Building Transmission Loss at 1.8 GHz
H. Börjeson, B. De Backer

Direction-of-Arrival Determination Using 3-Axis Crossed Array and ESPRIT
R. Eckhoff

System Performance of DS/SS Inter-Vehicle Communication and Ranging System Under Rician Fading Channel
N. Fujimoto, M. Nakagawa

Novel Generalized Optimal Fractional Delay Filter Design for Navigational Purposes
A.J.R.M. Coenen



Thursday, September 10 — Morning

C1 Interference Cancellation for CDMA Systems	C2 OFDM I	C3 Multimedia Wireless	C4 Indoor and Urban Radio Propagation
Chair: Ryuji Kohno	Chair: Brian Woerner	Chair: Zygmunt Haas	Chair: Henry Bertoni
Joint Frequency Offset and Delay Profile Estimation Technique for Nonlinear Co-Channel Interference Canceller H. Murata, S. Yoshida Experiments on Coherent Multistage Interference Canceller for DS-CDMA Mobile Radio M. Sawahashi, H. Andoh, K. Higuchi, F. Adachi Optimal Linear-Quadratic Statistical Processing for Interference Cancellation in CDMA Systems M.R. Shikh-Bahaei, A.H. Aghvami Interference and Capacity in CDMA Hybrid Systems With Hysteresis Margin A. Rojas, J. Paradells Performance Evaluation of CDMA Adaptive Interference Canceller With RAKE Structure Using Developed Testbed in Multiuser and Multipath Fading Environment H. Mizuguchi, S. Yoshida, A. Ushirokawa Multi-Carrier CDMA System With Parallel Interference Cancellation for Multipath Fading Channels H.K. Park, E.B. Kim, Y. Lee, K.H. Tchah Time-Varying MMSE Interference Suppression in Asynchronous DS/CDMA Systems Over Multipath Fading Channels S. Buzzi, M. Lops, A.M. Tulino Blind Multiuser Interference Cancellation in Multicarrier CDMA: A Linearly Constrained Constant Modulus Approach J. Míguez, L. Castedo	A Maximal Ratio Combining Frequency Diversity ARQ Scheme for OFDM Signals T. Kumagai, M. Mizoguchi, T. Onizawa, H. Takanashi, M. Morikura On the Optimality of Metrics for Coarse Frame Synchronization in OFDM: A Comparison S.H. Müller-Weinfurter Maximum Likelihood Decoding of M-ary Orthogonal Modulated Signals for Multi-Carrier Spread-Spectrum Systems A. Dekorsy, S. Fischer, K.-D. Kammeyer Analysis of Cochannel Interference in Multi-Cell OFDM Networks C.-H. Yih, E. Geraniotis Multicarrier Systems With Imperfect Channel Knowledge A. Leke, J.M. Cioffi Performance of Noncoherent Multiple Tone-Frequency Shift Keying Signals in Rayleigh Fading Channels With Diversity and Diversity Combining I. Ghareeb, A. Yongaçogolu Generalized Analysis of Envelope Fluctuations in the Reduced Mobile Complexity OFDM Scheme A.I. El-Arabawy, S.C. Gupta	Energy Efficient Protocols for Wireless Systems P. Agrawal (<i>Invited Paper</i>) Throughput and Delay Analysis of a Novel Slotted CDMA MAC Protocol for Multimedia Communication in Wireless LANs P.E. Omiyi, T. O'Farrell ARMAP — An Energy Conserving Protocol for Wireless Multimedia Communications P. Bahl Performance Analysis of PRMA With Integration of Voice and Buffered Data Users T. Wan, A.U. Sheikh, Y. Gu, A. Atwery A New Design Algorithm for Integrated Digital Communications Systems D.G. Daut, W. Ma TUTMAC: A Medium Access Control Protocol for a New Multimedia Wireless Local Area Network M. Hännikäinen, J. Knuutila, A. Letonsaari, T. Hämäläinen, J. Jokela, J. Ala-Laurila, J. Saarinen Reduced Complexity Maximum Likelihood Estimator for High Speed Wireless Access — TCS-MLSCE Y. Kakura, T. Ohsawa, K. Okanoue Research on Error-Correcting Scheme of Image Transmission in Fast Fading Mobile Channel Y. Dongfeng, L. Jijun, W. Lei	Experimental Analysis of the Use of Angle of Arrival at an Adaptive Antenna Array for Location Estimation R. Owen, L. Lopes Propagation Characteristics for Indoor Broadband Radio Access Networks in the 5 GHz Band C. Bergljung, P. Karlsson Analysis of 60 GHz Band Indoor Wireless Channels With Channel Configurations J.-H. Park, Y. Kim, Y.-S. Hur, K. Lim, K.-H. Kim Characterization of the Spatial Distribution of RMS Delay Spread in Indoor LOS Wireless Environments at 5.2 GHz J.T.E. McDonnell, T.P. Spiller, T.A. Wilkinson Indoor Radio Channel Modeling — Bridging From Propagation Details to Simulation S. Mangold, M. Lott, D. Evans, R. Fifield Modelling and Analysis of Dominant Propagation Effects in Real Indoor Environment at 5.2 GHz F. Loyer, R. Kattenbach, H. Früchtling Comparison Between Two Geometric Indoor Propagation Models: Tube-Launching vs. Ray-Launching S.J. Flores, L.F. Mayorgas, F.A. Jiménez, N. Cardona Propagation Model for Urban Microcellular Systems at the UHF Band N.C. Gonçalves, L.M. Correia



Thursday, September 10 — Morning

C5 Network Aspects	C6 Wireless Optical Networks	C7 ACTS MBS and W-LAN
Chair: Lin-Nan Lee	Chair: Mahmoud Naghshineh	Chair: Jørgen Bach Andersen Organizer: Jorge Pereira
Microcellular Reuse Pattern in an Urban Environment M.D. Yacoub, A.F. de Toledo, P.R.C. Gomez, P.J.E. Jeszensky, E.B.R. Férís	Amplifier Linearization for the Local Multipoint Distribution System Application K. Muhonen, M. Kavehrad (Invited Paper)	Third Generation: A Unified Architecture to Provide Mobile Multimedia J.M. Pereira (Invited Paper)
On Optimizing the Location Update Costs in the Presence of Database Failures Z.J. Haas, Y.-B. Lin	Rate-Adaptive Indoor Infrared Wireless Communication Systems Using Punctured Convolutional Codes and Adaptive PPM M. Matsuo, T. Ohtsuki, I. Sasase	Design and Performance Evaluation of a Mobility Management Protocol for Wireless ATM Networks A. Kaloxylas, G. Alexiou, S. Hadjiefthymiades, L. Merakos
Prioritised Multi-Bearer Transport in DECT Systems A. Iera, S. Marano, A. Molinaro, C. Narciso	Performance Evaluation of L-PPM Links Using Repetition Rate Coding T. Ozugur, M. Naghshineh, P. Kermani, C.M. Olsen, B. Rezvani, J.A. Copeland	Performance Evaluation of a High Frequency ATM Wireless Access System Using Directional Antennas P. Hafezi, M. Beach, Y. Sun, A. Nix
Design and Performance of Radio Channel Control Method for AWA Prototype H. Sato, T. Terashima, T. Okada, T. Manabe, H. Matsue	Performance of a Spread Spectrum Infrared Transmission System Under Ambient Light Interference T. O'Farrell, M. Kiatweerasakul	Signaling and Mobility Control for Wireless Intelligent ATM CPNs N.H. Loukas, C.K. Xenakis, L. Merakos, I. Venieris
Call Admission Control in DCA Wireless Network W.Y. Ming, J. Mišić, S.T. Chanson	Comparison of Go-Back-N and Selective Reject ARQ Modes of HDLC Over Half-Duplex and Full-Duplex IR Links and the Effects of Window Size and Processor Speed in Utilization T. Ozugur, M. Naghshineh, P. Kermani	Impact of Shaped Lens Antennas on MBS Systems J. Fernandes, C. Fernandes
Performance Analysis of Interference Adaptive Dynamic Channel Allocation in Practical TDMA/FDMA Wireless Networks Z. Xu, A.N. Akansu, S. Tekinay	A Partial-Response Precoding Scheme for Indoor Wireless Infrared Communication H. Park, J.R. Barry	Capacity Trade-Offs in Mobile Broadband Systems Using Guard Channels for High Mobility Handover F.J. Velez, L.M. Correia
Dynamic Cell-Size Control According to Geographical Mobile Distribution in a DS/CDMA Cellular System T. Togo, I. Yoshii, R. Kohno	On the Performance of an Optical Decorrelating Receiver for Optical Orthogonal Code-Division Multiple-Access Systems Y. Cho, J.H. Lee	A DLC Layer Framework for Wireless ATM Networks N.B. Pronios, I.E. Dravopoulos, A.I. Andritsou



Thursday, September 10 — Afternoon

D1 Performance of CDMA Networks	D2 OFDM II	D3 Wireless Data	D4(a) Propagation Studies I
Chair: Mohsen Kavehrad	Chair: Arthur Giordano	Chair: Jae Hong Lee	Chair: Sirin Tekinay
Performance of a Multicarrier DS/CDMA System With Adaptive Antenna Array in a Nakagami Fading Channel J.Y. Kim, J.H. Lee	A Novel Low Complexity Technique to Reduce Non-Linear Distortion Effects in OFDM Systems D. Dardari, V. Tralli, A. Vaccari	On Tractable Wireless Channel Models A.M. Chen, R.R. Rao (<i>Invited Paper</i>)	Evaluation of the Multipath Characteristics of the Impulse Radio Channel R.J.-M. Cramer, M.Z. Win, R.A. Scholtz
On the Capacity of Cellular CDMA Systems With Multibeam Antennas Y. Hara, R. Yonezawa, I. Chiba	Coding Techniques for Power Controlled OFDM K.G. Paterson	Channel Segregation for Slot Assignment in Integrated Voice and Data Systems K. Al agha, D. Zeghlache	Theoretical Analysis of Propagation Characteristics in Millimeter Waves Inter-Vehicle Communication System
Comparing the Capacities of FH/SSMA and DS/CDMA Networks H. El Gamal, E. Geraniotis	Coarse Frame Synchronisation for OFDM Based Wireless Communication Systems K. Brüninghaus, M. Radimirsch	Energy-Conserving Selective Repeat ARQ Protocols for Wireless Data Networks I. Chlamtac, C. Petrioli, J. Redi	T. Wada, M. Maeda, M. Okada, K. Tsukamoto, S. Komaki
Capacity Analysis of DS-CDMA System With Beam Steering-Sectorized Antenna Over Nakagami Frequency-Selective Fading Channels J. Mar, T.-D. Lin	Compensation of Nonlinear Distortion in OFDM Systems Using a New Predistorter I.-S. Park, E.J. Powers	Performance of a Multi-Rate CDMA Packet Data System R. Walton, J. Ketchum	Path Loss Predictions in Urban Areas Sprawling Over Irregular Terrain R. Janaswamy, J.B. Andersen
Multi-Rate Multi-Code CDMA Using FWT for Mobile and Personal Communications M.F. Madkour, S.C. Gupta	A Novel Method for Blind Frequency Offset Correction in an OFDM System M.A. Visser, P. Zong, Y. Bar-Ness	Optimal Forward Link Power Allocation for Data Transmission in CDMA Systems S. Sun, W.A. Krzymien, A. Jalali	Effects of Large Grid Size Discretization on Coverage Prediction Using the ParFlow Method J. Li, J.-F. Wagen, E. Lachat
On the Bit Error Behaviour of Coded DS-CDMA With Various Modulation Techniques D. Nikolai, K.-D. Kammeyer, A. Dekorsy	Application of Amplitude Gain Estimation Techniques for Multilevel Modulation in OFDM Systems B.Y. Prasetyo, A.H. Aghvami	A Heuristic Algorithm for Channel Allocation of Multi-Rate Data in Hybrid TDMA/FDMA Digital Cellular Systems W.-L. Wan, W.-S. Wong	D4(b) Modulation, Coding, and Equalization I Chair: Vijay Bhargava
Performance of ODS-CDMA QPSK in a Soft-Limiting AM/AM Nonlinearity Channel P.R. Pawlowski		Hybrid Channel Assignment for Accommodating Integrated Voice/Data Traffic in DS-CDMA Networks J.H. Kim, T.S. Kim, Y.W. Kim, D.K. Sung	Error Floor of Pulse Amplitude Modulation With Adaptive Sampling in Time-Dispersive Fading Channels A.F. Molisch, H. Bölcskei
			Pilot Symbol Assisted Modulation Using Encoder Tail Bits Y.-G. Kang
			Combined MLSE/Symbol-Based- Demodulation Scheme for Fading Channels With and Without Delay Spread W. Sung, I.-K. Kim
			Achieving MAI Cancellation in an Asynchronous DS/CDMA System by Optimum Single-User Detection N.R. Patel, T. O'Farrell



Thursday, September 10 — Afternoon

D5 Power Control

Chair: John Rulnick

Enhancing Network Quality Using Baseband Frequency Hopping, Downlink Power Control and DTX in Live GSM Network

T.T. Nielsen, J. Wigard, S. Skjærriis, C.O. Jensen, J. Elling

Power Control in Cellular Radio Systems With Multicast Traffic

C.-G. Löf

SIR-Balanced Macro Power Control for the Reverse Link of CDMA Sectorized Distributed Antenna System

H. Yanikomeroglu, E.S. Sousa

Power Control and Sector Antennas for Improved DS/SS Inter-Vehicle Communication

L.B. Michael, M. Nakagawa

Adaptive Closed-Loop Power Control With Quantized Feedback and Loop Filtering

H.-J. Su, E. Geraniotis

Performance Evaluation of DS/CDMA Systems Employing Adaptive Transmission Rate Under Imperfect Power Control

B. Hashem, E. Sousa

Selecting the Feedback Rate for SIR-Based Power Control in Wireless TDMA Networks With Slowly Moving Terminals

E. Anderlind

D6 Smart Antennas

Chair: Ahmad Bahai

Forward Link Capacity in Smart Antenna Basestations With Dynamic Slot Allocation

R. Sinha, T.D. Todd, F. Shad, V. Kezys

A Novel IS-95 CDMA Mobile Station Receiver Structure With Smart Antenna Canceller

W. Ye, Y. Bar-Ness, A.M. Haimovich

Smart Antenna Testbed for High Speed Wireless Communications

F. Chin, M. Chia

Modeling & Simulating Fading Channels for Systems With Smart Antennas

J. Baltersee

The Benefits of Intelligent Antenna Arrays in TD-CDMA — A Study Based on Measured Channel Impulse Responses

M. Weckerle, A. Papathanassiou, D. Emmer

Signal Processing Improvements for Smart Antenna Signals in IS-95 CDMA

S. Affes, P. Mermelstein

MAC Layer Performance With Steerable Multibeam Antenna Arrays

A. Chockalingam, R.R. Rao

D7 ACTS System Aspects

**Chair: Pilar Díaz
Organizer: Jorge Pereira**

UMTS Universal Mobile Telecommunications System Development of Standards for the Third Generation

A. Samukic (*Invited Paper*)

Advanced End-to-End Broadband and Ubiquitous Mobile Satellite Service Demonstration Using Ka Band Technology

G. Losquadro, M. Barbieri

Inter-Segment Handover Algorithm for an Integrated Terrestrial/Satellite-UMTS Environment

N. Efthymiou, Y.F. Hu, R.E. Sheriff, A. Properzi

The TOMAS Satellite-UMTS Inter-Trial Platform

A. Schubert, A. Timm

The MOSTRAIN (Mobile Services for High Speed Trains) System Demonstrator

J. Irvine, D. Robertson, J. Dunlop

Network Planning Methodology Applied to the UTRA Specifications

J.G. Markoulidakis, R. Menolascino, F. Galliano, M. Pizarroso

A Simple Algorithm to Distribute Optimally a Number of External Base Stations in a Microcellular Environment

R.A. Comes, X.M. Querol, J.P. Romero



Friday, September 11 — Morning

E1 CDMA I	E2 Modulation, Coding, and Equalization II	E3 Medium Access Methods I	E4 Propagation Studies II
Chair: John Orr	Chair: John Proakis	Chair: Prathima Agrawal	Chair: Seiichi Sampei
Uplink System Performance of High-Speed IS-95 CDMA With Mixed Voice and Bursty Data Traffic M. Cheng, L.F. Chang Other Cell Interference and Capacity of Power Controlled CDMA in Wireless Fixed Access Networks H. Stellakis, A. Giordano, A. Asku, W. Biagini CDMA Reverse Link Capacity in a Manhattan Like Microcellular System F.A. Cruz-Pérez, D. Lara-Rodríguez Using Higher Order Constellations With Minimum Mean Square Error (MMSE) Receiver for Severe Multipath CDMA Channel P. Shamain, L.B. Milstein Learning Algorithms for Blind Multiuser Detection in CDMA Downlink J. Joutsensalo, T. Ristaniemi Approximation of an Integrated CDMA System M. Watson, T. Mitchell Effects of Downlink Intercell Interference on MC-CDMA System Performance M. Nunes, J. Santos, A. Rodrigues, J. Punt, H. Nikokaar, R. Prasad	A Simple and Accurate Analysis of Digital Communication Systems With Diversity Reception in Different Fading Environments A. Annamalai, C. Tellambura, V.K. Bhargava (<i>Invited Paper</i>) Performance of Real-Time Video Transmission Using Error Control Over Rayleigh and Rician Fading Channels N. Matoba, Y. Kondo, T. Tanaka A Study on Iterative Decoding Techniques Applied to GSM Full-Rate Channels F. Jordan, K.-D. Kammeyer Three-Dimensional Regression Polynomial Coding for Video Transmission Y.-J. Lan, A.-Y. Chen, J.-L. Lin, K.-A. Wen Adaptive Equalizer Including Frequency-Offset Compensator for Multi-Carrier Communication Systems N. Kataoka, R. Kohno Reduced Rank Space-Time Equalization E. Lindskog, C. Tidestav Scaling Functions and the Optimum Nyquist-Type Signaling Waveform in Digital Communications M. Liu, F.W. Fairman, C.J. Zarowski	Analysis of a Novel Feedback Scheme to Increase Throughput in Multiple Access Radio Systems R.O. LaMaire, A. Krishna Energy Efficiency Analysis of a Multichannel Wireless Access Protocol A. Chockalingam, W. Xu, M. Zorzi, L.B. Milstein Capacity of S-ALOHA Protocols Using a Smart Antenna at the Basestation F. Shad, T.D. Todd Reservation Code Multiple Access With Control Code for Voice Terminal O. Arakawa, T. Kobayashi, I. Sasase Robust Broadcast: Improving the Reliability of Broadcast Transmissions on CSMA/CA J. Tourrilhes Spatial Distribution Analysis With Capture Effect of a Mobile S-ALOHA Network D. Covarrubias, S. Ruiz, J. Huguet, J. Olmos Spectral Efficiency for FDMA and DS-CDMA in Cellular Systems P. Varzakas, G.S. Tombras DPAP: A Dynamic Polling Based Access Protocol for Wireless Networks S.S. Alwakeel, M.M. Al-Fawaz	Frequency-Domain Simulation and Analysis of the Frequency-Selective Rician Fading Radio Channel K. Witrisal, Y.-H. Kim, R. Prasad Outage Analysis of Cellular Systems in an Arbitrary Lognormal Shadowed Rician Environment Q.T. Zhang An Experimental Performance Comparison Between Antenna Diversity Schemes at 1800 MHz M. Pettersen, F. Aanvik, E. Antonsen Coverage Prediction for Cellular Networks From Limited Signal Strength Measurements K. Manoj, P. Bernardin, L. Tamil Propagation Studies of Ka-Band Wavebeams of Broadband Wireless Systems G.A. Andreyev, S.A. Ogarev Propagation Measurements and Modeling in Jinan City J. Wu, D. Yuan Correlation Model for Slow Fading in a Small Urban Macro Cell T.B. Sørensen Measurements of 28 GHz Diffraction Loss by Building Corners P.A. Tenerelli, C.W. Bostian



Friday, September 11 — Morning

E5 Traffic Engineering	E6(a) Satellite Networks	E7 ACTS Enabling Technologies
Chair: Ramesh Rao	Chair: Vimal Dubey	Chair: Ramjee Prasad Organizer: Jorge Pereira
Traffic Engineering for the Wireless LAN Access Point A. Zahedi, K. Pahlavan, J.M. Rulnick	Maximum Likelihood Acquisition of Time and Frequency Shift in Land Mobile DS-CDMA System G. Wetzker, F. Jondral	A Multimedia Communication Architecture for Handheld Devices J. Meggers, A.S.-B. Park, A. Fasbender, B. Kreller, L. Alonso
Performance Modeling and Analysis of Hierarchical Wireless Communications Networks With Overflow and Take-Back Traffic Y. Zhou, B. Jabbari	Exact Performance Analysis of Spread Spectrum Satellite Networks A.-G.A. Daraiseh, S. Almadi, M.A. Rowily	Equalization of Satellite UMTS Channels Using RBF Networks S. Bouchired, M. Ibnkahla, D. Roviras, F. Castanié
Signalling Traffic Impacts in Cordless-Cellular Integrated System S. Ghaheri Niri, R. Tafazolli	Performance of Multi-Carrier CDMA With Iterative Detection for a Doppler Shift Channel in a LEO Mobile-Satellite Communications Environment M.S. Akhter, J. Asenstorfer	HTS-Technology for UMTS Radio Basestations H. Chaloupka, D. Jedamzik
Validation of Models for Traffic Resulting From Mobility in Microcellular Mobile Broadband Systems F.J. Velez	Propagation Impairment Caused by Aircraft's Flying Across the Earth-Satellite Link H. Zhang, H. Ando, R. Sato, T. Yoshino, S. Ito, Y. Nagasawa	Downlink Calibration Requirements for the TSUNAMI (II) Adaptive Antenna Testbed C.M. Simmonds, M.A. Beach
Battery Consumption and Handoff Examination of a Cellular Ad-Hoc United Communication System for Operational Mobile Robots T. Adachi, M. Nakagawa		Blind Equalization Based on Spatial and Temporal Diversity in Block Coded Modulations F. Rey, M. Lamarca, G. Vázquez
Cellular Planning Optimisation for Non-Uniform Traffic Distributions L. Santos, L.S. Ferreira, V. Garcia, L.M. Correia	E6(b) TDMA Chair: Silvia Ruiz	Optimal Array Combiner and Sequence Detector in Mobile Radio Channels J. Vidal, M.A. Lagunas, A.I. Perez-Neira, J.R. Fonollosa
Traffic Controlled Spatial Reuse TDMA in Multi-Hop Radio Networks J. Grönkvist	Evaluation of Techniques for Cochannel Interference Cancellation in TDMA Communication Systems N. Georganopoulos, A.H. Aghvami	High Gain Antennas in a Random Environment J.B. Andersen
	CHOS-Based Channel Tracking in Cellular TDMA Communications M. Martone CFAR TDMA Burst Detection Schemes for Constant Modulus Signals I.-K. Kim, W. Sung Capacity of TDMA Cellular Systems With Slow Rayleigh Fading Counter-Measures D.A.J. Pearce, A.G. Burr, T.C. Tozer	



Friday, September 11 — Afternoon

F1 CDMA II	F2 Modulation, Coding, and Equalization III	F3 Medium Access Methods II	F4 Antenna Systems
Chair: Pentti Leppanen	Chair: Khaled Ben Letaief	Chair: Kwang-Cheng Chen	Chair: Yeheskel Bar-Ness
A Dynamic Load Sharing Algorithm Through Power Control in Cellular CDMA J.X. Qiu, J.W. Mark	DC Offset Canceller in a Direct Conversion Receiver for QPSK Signal Reception H. Yoshida, H. Tsurumi, Y. Suzuki	Guaranteed Quality of Service Wireless Access to Broadband Networks K.-C. Chen, C.-S. Chang <i>(Invited Paper)</i>	Adaptive Multistage Beamforming of Cellular Signals Using Cyclic Higher-Order Statistics M. Martone
Performance Study of the Adaptive MMSE Maximum Likelihood CDMA Receiver P.B. Rapajic, D.K. Borah	Frequency Stabilized Direct GMSK Modulator D.M. Klymyshyn, S. Kumar, A. Mohammadi	An Efficient Media Access Control Protocol for Delay Sensitive Bursty Data in Broadband Wireless Networks J. Jiang, T.-H. Lai	Transmit Antenna Array Techniques for Cellular CDMA Systems Y.-C. Liang, F. Chin
A Simple and Accurate Analysis Method of SIC Performance Using Spatial Cell Modeling in DS/CDMA System K.S. Kim, C.S. Kang	Analysis of 16-QAM Over a Nonlinear Channel G. Chrisikos	A New Digital Sense Multiple Access (DSMA) Protocol for High-Speed Wireless Networks K.K. Leung, J.-M. Ho, H. Chien	A Controlled Distributed Antenna System for Increasing Eb/Io in the DS-CDMA System J.H. Lee, J.H. Roh, J.H. Kwun, C.E. Kang
Performance of a New Channel Estimator for Fast Fading and High Frequency Offset in DS-CDMA/QPSK S. Ko, K. Lee, H. Choi	Successive-Erasure Decoding of RS Codes and Error Detection for ARQ F. Poegel, A. Finger	A Low Delay Algorithm for the Multiple Access Channel With Rayleigh Fading I. Bettesh, S. Shamaï (Shitz)	Maximum Likelihood Multipath Channel Parameter Estimation in CDMA Systems Using Antenna Arrays C. Sengupta, J.R. Cavallaro, B. Aazhang
Iterative Decoding and Channel Estimation of DS/CDMA Over Slow Rayleigh Fading Channels H. El Gamal, M.M. Khairy, E. Geraniotis	MPEG-4: A Flexible Coding Standard for the Emerging Mobile Multimedia Applications L.D. Soares, F. Pereira	Two Medium Access Control Schemes for DS-CDMA Personal Communication Networks J. He, M.T. Liu	Validation of a High Resolution Measurement Technique for Estimating the Parameters of Impinging Waves in Indoor Environments M. Tschudin, R. Heddergott, P. Truffer
Modified Multi-Rate Detection for Frequency Selective Rayleigh Fading CDMA Channels J. Ma, H. Ge	A Novel and Efficient Solution to Block-Based Joint-Detection Using Approximate Cholesky Factorization H.R. Karimi, N.W. Anderson	Performance Analysis of Multi-Code Spread Slotted ALOHA (MCSSA) System: Finite and Infinite Population S. Dastangoo, S. Resheff, B.R. Vojcic	An Adaptive Array Antenna Using Combined DFT and LMS Algorithms K. Watanabe, I. Yoshii, R. Kohno
On the Performance of Adaptive MMSE Detectors for a MC-CDMA System in Fast Fading Rayleigh Channels D.N. Kalofonos, M. Stojanovic, J.G. Proakis	The Performance of TCM 16-QAM With Equalization, Diversity and Slow Frequency Hopping for Wideband Mobile Communications J. Wu, R.-H. Yan, A.H. Aghvami	Iterative Soft Onion Peeling for Multi-Access and Broadcast Channels N. Chayat, S. Shamaï (Shitz)	Problems of Implementing Adaptive Array Antennas in CDMA Systems A. Morimoto, M. Katayama, T. Yamazato, A. Ogawa



Friday, September 11 — Afternoon

F5 Resources Management Techniques	F6 Spread Spectrum	F7 GSM	F8(a) Security and Privacy
Chair: Allen Levesque	Chair: Takis Mathiopoulos	Chair: Juha Rapeli	Chair: Christof Paar
Power Control for Wireless Data Based on Utility and Pricing V. Shah, N.B. Mandayam, D.J. Goodman (<i>Invited Paper</i>)	Performance Analysis of mMFSK Frequency Hopping Modulation for Wireless Ad Hoc Networks S. Glisic, Z. Nikolic, N. Milosevic, A. Pouttu (<i>Invited Paper</i>)	A Comparison of GSM Receivers for Fading Multipath Channels With Adjacent- and Co-channel Interference B.A. Bjerke, J.G. Proakis, M.K. Lee, Z. Zvonar	Security Design for a New Wireless Local Area Network TUTWLAN K.-T. Salli, T. Hämäläinen, J. Knuutila, J. Saarinen
Dynamic Resource Allocation With Interference Avoidance for Fixed Wireless Systems X. Qiu, K. Chawla	Linear Timing Acquisition Scheme in DS-CDMA Communication System C.-M. Chang, K.-C. Chen	Analysis of GSM HSCSD Service With Channel Allocation Constraints D. Calin, D. Zeghlache	A Distributed Intelligent Agent Approach for Fraud Detection in PCS S. Abu-Hakima, M. Toloo
Fixed Wireless Access System With Autonomous Resource Assignment M.A. Haleem, D. Avidor, R. Valenzuela	CDMA Downlink Code Acquisition Performance in Frequency-Selective Fading Channels M. Latva-aho, J. Lilleberg, J. Iinatti, M. Juntti	Speech Quality Based Performance Evaluation of a Partially Loaded GSM System A. Arregui, J. Dunlop	Security System for Wireless Local Area Networks L. Korba
G-CBWL: A Dynamic Frequency Allocation Technique Suitable for GSM M.P. Althoff, M. Scheibenbogen, P. Seidenberg	A Predistorter for Nonlinear Distortion in Multi-Code CDMA Systems K.-S. Jin, Y. Shin, S. Im	An Analysis of Fixed Wireless Network Interconnect Costs R.A. Stanley, S. Resheff	Security Issues for Wireless ATM Networks D. Patiyoote, S.J. Shepherd
Enhanced Dynamic Radio Resource Allocation Performance Using a Gradient Descent Algorithm W.A. Egner, V.K. Prabhu	An Adaptive Filtering PN Code Acquisition Scheme With Improved Acquisition Based Capacity in DS/CDMA M.G. El-Tarhuni, A.U.H. Sheikh	Interference Analysis of a Total Frequency Hopping GSM Cordless Telephony System J. Deißner, A.N. Barreto, U. Barth, G. Fettweis	F8(b) PCS Systems Chair: Samuel Resheff
Performance Evaluation of Adaptive Zone Configuration System N. Ichikawa, A. Kanazawa, H. Harada, S. Shinoda	Innovative Coding Scheme for Spread-Spectrum Communications V. Sorokine, F.R. Kschischang, S. Pasupathy	Bit Error Rate Based Link Adaptation for GSM J. Pons, J. Dunlop	
Performance of a Distributed Coverage SFH-TDMA System With Mobility Management in a High Density Traffic Network A. Wautier, J. Antoine, J. Brouet, V. Kumar	Near-Far Resistant Detection of Symbol and Chip-Timing Error in Asynchronous DS/CDMA Communication System S.-H. Yoon, K.-S. Hong	Capacity and Speech Quality Aspects Using Adaptive Multi-Rate (AMR) O. Corbun, M. Almgren, K. Svanbro	
Wireless Resources Management Using Virtual Class Concept E.-J. Ha, J.-T. Park	Matched Filter Acquisition in Fixed Multipath Channel J. Iinatti, M. Latva-aho		Grouping Cells in PCS Networks E. Cayirci, C. Ersoy Optimization Approach to Prioritized Transmitter Removal in a Multiservice Cellular PCS S.-L. Kim Personal Computing and Communication — A Swedish Strategic Research Program B.-A. Molin

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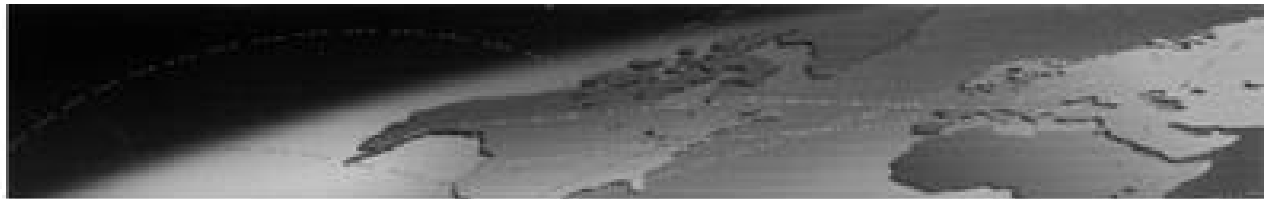
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A cell phone is only as good as the network it's on.[®]

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AD20msp425

GSM/DCS1800/PCS1900 Baseband Processing Chipset

REDUCE TIME TO MARKET WITH LOW-RISK, FAST DEVELOPMENT SOLUTIONS FOR DIGITAL MOBILE PHONES

The AD20msp425 baseband processing chipset offers industry-leading advances in cost, size and power consumption for next generation handsets based on GSM, DCS1800 and PCS1900 cellular-phone standards.

This low-risk solution is built on the same system architecture as the type-approved AD20msp410 and AD20msp415, thereby significantly shortening handset design and test time and facilitating type approval for new phones. The AD20msp425 cuts development and testing times to well below the six months the process typically requires.

In addition, the AD20msp425 offers functional enhancements and extensive power-saving features that let you produce smaller, lighter-weight mobile phones that outperform your competition. The new chipset even incorporates all necessary hardware and software for enhanced personal-computer fax and data services that previously required an external printed-circuit board.

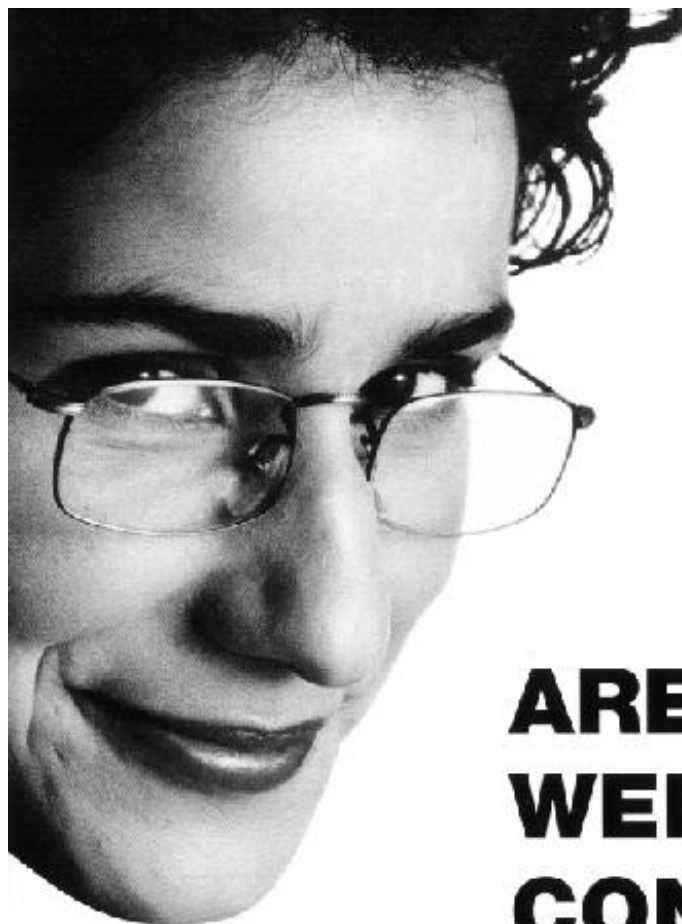
Analog Devices' newest GSM baseband processing chipset, the AD20msp425, provides dramatic cost and performance advantages, and allows for fast production ramp-up.



FEATURES

- Full-rate (FR) and enhanced full-rate (EFR) voice codecs for better voice quality than ever before
- Fully integrated hardware and software for data and fax/modem capability up to 11.4 kbps
- Reduces development time: speeds design, testing and type approval
- Ultralow standby power consumption, permitting more than 300 hours of handset standby time
- Compact and lightweight: the plastic BGA package consumes 70 percent less board space chip-for-chip than the AD20msp415
- Same architecture and interfaces as the type-approved AD20msp410 and AD20msp415
- GSM Phase 2 compatible — Phase 2 protocol stack available
- Layer 1 software included: uses the same software as type-approved AD20msp410 and AD20msp415
- Flexible support options: complete development system or turn-factor reference design





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WELL
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