APOSTOLOS K. KAKAES
Cosmos Communications Consulting Corporation, President
908 Park St. SE, Suite 201
Vienna, Virginia 22180
703-310-6076 (Office); 703-981-0999 (Mobile);
e-mail: akakaes@gmail.com

AREAS OF EXPERTISE

All aspects of fixed and mobile communications. Over the years, my emphasis has been both in breadth and in depth, originally in fixed communications networks and then in mobile communications. Specific areas of in-depth expertise include:

- NR/5G, LTE/LTE-Advanced and evolution issues of 3G to 4G and 5G
- UMTS, including FDD, TDD, HSDPA/HSUPA, HSPA+, both air interface (UTRA) and Radio Access Network (RAN) as well as Core Network (CN) technologies
- GSM, GPRS, EDGE (EGPRS) and related evolutionary problems and solutions
- cdma2000 family from IS-95, through its evolution to 1x, 3x, 1xEV-DO (HDR), 1xED-DV (all aspects of the evolution to "3G" and beyond)
- Wired and Wireless Local Area Networks (LAN) including all variants of IEEE 802.11 (WiFi)
- Metropolitan Area Networks (MAN), and Personal Area Networks (PAN) technologies, Paging networks, Ad hoc networks, including IEEE 802.16 (WiMAX), HIPERLAN, Bluetooth, Near Field Communications, IrDA (Infrared Data Association) operating with any of the available access technologies
- North American TDMA and IS-54/IS-136
- IMS, SIP, and VoIP (Voice over IP), including VoIP over LTE
- TETRA
- iDEN™
- Core Network technologies, IS-41, SS7, ATM, MAP, SAE, etc.
- Design and implementation of voice and data networking (circuit switching as well as all the evolving all IP-based technologies)
- Traffic engineering and network design; both air interface aspects (including resource allocation, QoS, MAC protocol, etc.) and design of core network, both user plane and control plane

EMPLOYMENT HISTORY

9/88 – Present
Cosmos Communications Consulting Corporation. Founder and president of private communications engineering consulting firm specializing in mobile communications. Initially part time; full time since 1994.

- Developed and presented courses, seminars, and lectures on fixed and mobile communications to both corporate and government entities, such as the FCC and the US Marshal's Office.
- Consulted on high level technology-related issues and trends, pros and cons of each, etc. to corporate entities, governmental agencies, and international organizations, such as the UN.

- Consulted at the detailed technical level to engineering firms, operators, and equipment vendors on technical issues related to existing or evolving technologies for mobile communications.
- Served as technology consultant to the investment community on issues related to both fixed and wireless communications technologies.
- Served as consultant and/or testifying expert witness on both civil and criminal legal cases, including a class action lawsuit brought in California, a murder case in Illinois, and several patent infringement cases both at the ITC and in US district courts as well as in the High Court in the UK.
- Served as consultant and/or testifying expert witness on several Inter-Parte Re-examinations (IPRs).
- Served as consultant and testifying witness in Arbitrations involving mobile communications.
- Served as consultant and/or testifying expert witness in multiple legal proceedings involving the determination of "FRAND" rates for global licenses involving "SEP" patents.
- Participated as a technical consultant in the analysis of large patent portfolios for the purposes of due diligence, sales, and/or M/A activities for some of the largest companies in the mobile communications space.

Many of the above projects spanned a multidimensional spectrum of

- Technologies: both fixed and mobile communications as they have evolved over the past 30+ years;
- Audiences: non-technical support personnel, highly specialized engineers, Wall Street analysts, hedge fund managers, litigation teams, as well as decision making executives at the CEO/CFO/CTO level;
- Geographic and cultural backgrounds that span all continents and over 40 countries.

9/87 - 5/94
The George Washington University, Washington, D.C.; Department of Electrical Engineering and Computer Science.

- Taught mostly graduate courses in the area of communication engineering, including communication theory, coding theory, voice and data networking, and mobile communications.
- Proposed, developed and taught new graduate courses in the area of mobile communications.
- Received several research awards/grants, including the prestigious NSF Research Initiation Award.
- Participated in several committees, including the departmental Graduate Curriculum Committee as well as various University-wide committees.

7/85 - 12/86
Polytechnic Institute of New York, Brooklyn, New York. Joint appointment as Special Research Fellow and Adjunct Instructor (while pursuing the Ph.D. degree).

1/82 - 7/87
AT&T Bell Laboratories, Holmdel, New Jersey. Worked on modeling, analysis, design, and performance evaluation of voice and data networks. Developed algorithms for DNHR (Dynamic, Non-Hierarchical Routing) used in the telephone network. Analysis of advanced data services and formulation of long term plans for development of enhanced data services and network design tools to support such services.

7/76 - 12/81
University of Colorado, Boulder, Colorado and Michigan State University, East Lansing, Michigan. Undergraduate and then graduate teaching assistant.

EDUCATION

09/82 - 01/88
Polytechnic Institute of New York. Ph.D. in Electrical Engineering with a minor in Applied Mathematics.

Thesis Title: Topological Properties and Design of Multihop Packet Radio Networks.

Thesis Advisor: Professor Robert R. Boorstyn.

09/74 - 06/80
University of Colorado.

M.S. in Applied Mathematics with a minor in Electrical Engineering.
B.S. in Applied Mathematics with a minor in Electrical Engineering.

PROFESSIONAL ASSOCIATIONS AND ACTIVITIES

- Member of the IEEE (Active in the Communications Society, Vehicular Technology Society, and the Information Theory Society).
- Secretary, IEEE Communications Society National Capital Area Chapter, 91/92.
- Vice-Chair, IEEE Communications Society National Capital Area Chapter, 92/93.
- Vice-Chair of the Communication Theory Technical Committee of the Communications Society of the IEEE; Elected for the 1993-1996 term.
- Treasurer of the Communication Theory Technical Committee of the Communications Society of the IEEE, Elected for the 1996-1999 term.
- Reviewer for the IEEE, book editors, and other technical publications.
- Reviewer for various NSF Panels.
- Active Participant and Organizer of Technical Sessions in Technical Conferences, including the IEEE International Conference on Communications (ICC) and IEEE Global Communications Conference (Globecom).
- Technical Program Chair for the Communication Theory Mini-Conference, Dec. 1992.

PUBLICATIONS AND PRESENTATIONS

1. "Topological Properties and Design of Multi-Hop Packet Radio Networks"; Presented at the IEEE Information Theory Society Meeting; Arlington, Virginia; February 1988.
2. "Topology and Capacity of Multi-Hop Packet Radio Networks" (Joint with R.R. Boorstyn); 1988 International Symposium on Information Theory; Kobe, Japan; June 1988.
3. "Placing Repeaters in Multi-Hop Packet Radio Networks" (Joint with R.R. Boorstyn); *Proceeding of Globecom '89*, Dallas, Texas; November 1989.
4. "Topological Properties and Design of Packet Radio Networks"; Invited Presentation at the National Technical University of Athens; Athens, Greece; January 10, 1990.
5. "Channel Allocation Strategies in Dual Mode Digital Cellular Networks"; *Proceedings of Globecom '90*, San Diego, California; December 1990.
6. "Bandwidth Allocation Techniques in Dual Mode Cellular Systems"; Invited Presentation at the Rutgers University Wireless Information Networks Laboratory (WINLAB); January 25, 1991.
7. "Some Topological Properties of Different Classes of Random Graphs with Applications to Communication Networks", *Proceedings of the IEEE Information Theory Symposium*, Budapest, Hungary; June 1991.
8. "The Effects of Residual Bandwidth in TDMA Cellular Networks", IEEE Communication Theory Workshop, Rhodes, Greece, July 1991.
9. "Concentrators and Concentrator Design", *Encyclopedia of Telecommunications*, Fritz E. Froehlich, Editor-in-chief; Marcel Dekker, Inc, 1992.
10. "Comparison of TDMA and CDMA for Cellular Networks," Ecole Nationale Superieure des Telecommunications, Paris, France, March 5, 1992.
11. "Dual Mode Digital Cellular Networks: The Effects of Bandwidth Segmentation on Digital and Analog Users," Presented at the IEEE Communications Society Meeting, April 16, 1992.
12. "Dynamic Channel Allocation and Reallocation for Dual-System Cellular Networks, *Workshop Record*, (with Sirin Tekinay and Bijan Jabbari), Third Winlab Workshop on Third Generation Wireless Information Networks, Piscataway, NJ, April 28-29, 1992.
13. "Spread Spectrum Technology Applications in Telecommunications," Tutorial presented at the 1992 IEEE Mohawk Valley Section Conference, June 1992.
14. "Spread Spectrum Fundamentals: Techniques and Applications", Tutorial (in cooperation with Giovanni Vannucci) presented at ICC'92, June 1992.
15. "Global System for Mobile Communications (GSM)", Presented at ICC'93, Geneva, Switzerland, May 25, 1993.
16. "Data Communications Basics", *Encyclopedia of Software Engineering*", John Wiley & Sons, Inc., 1993.
17. "Modelling of Cellular Communication Networks with Heterogeneous Traffic Sources" (with Sirin Tekinay and Bijan Jabbari), *Proceedings of the International Conference on Universal Personal Communications, 1993*, October 1993.
18. "Global System for Mobile Communications (GSM)", Presented at the Francusko-Polska Wysza Szkowa, Poznan, Poland, March 1994.

19. "Traffic Engineering for Cellular Network Design", Presented at the Francusko-Polska Wysza Szkowa, Poznan, Poland, March 1994.
20. "Principles of Traffic Engineering and Network Design", Presented at the Regional Seminar on Mobile Cellular Radio Telephone Systems, by invitation of the ITU, April 19, 1994.
21. "Principles of Spread Spectrum Systems for Mobile Communications", Presented at the Regional Seminar on Mobile Cellular Radio Telephone Systems, by invitation of the ITU, April 20, 1994.
22. "Global System for Mobile Communications (GSM)", Presented at the Regional Seminar on Mobile Cellular Radio Telephone Systems, by invitation of the ITU, April 21, 1994.
23. "Global System for Mobile Communications (GSM)", Presented at ICC'94, New Orleans, LA.; May 1, 1994.
24. "GSM and DCS1900: Evolution to PCS", ICC/Supercom 1996, Dallas, Texas; June 23-27, 1996.
25. "Traffic Engineering Models for Mobile Communications", ICUPC96, Cambridge, Massachusetts; Sept. 29 - October 2, 1996.
26. "GSM-Recent Advances and Future Developments", Globecom'96, London, UK; November 1996.
27. "Advances in GSM and DCS1800/1900", ICC '97, Montreal, Canada; June 1997.
28. "The Global System for Mobile Communications (GSM) and its Derivatives (DCS1800, PCS1900)", ICC/Supercom '98, Atlanta, GA; June 1998.
29. "Teletraffic Engineering", Globecom '98, Sydney, Australia; November 1998.
30. "Traffic Engineering" in Encyclopedia of Telecommunications; Edited by John Proakis, John Wiley, 2002.