

P.R. 4-3 Joint Statement, Exhibit C

WITNESS DISCLOSURE

In accordance with Defendants' P.R. 4-2 disclosures, Defendants may rely upon testimony (by declaration or hearing testimony) from Dr. John G. Proakis. A copy of Dr. Proakis' curriculum vitae is attached hereto as Exhibit C-1.

In accordance with P.R. 4-3(d), Dr. Proakis may testify about his background, the background of the subject matter discussed in U.S. Patent Nos. 5,282,222 (the '222 patent) and/or RE37,802 (the '802 patent), and the skill level of one of ordinary skill in the art. Additionally, Dr. Proakis may testify to his opinion that one of ordinary skill in the art would understand the term "direct sequence spread spectrum codes" to mean "pseudo random noise sequences over which information bits are spread," that the proper construction of the term "direct sequence spread spectrum codes" in view of the intrinsic evidence is "pseudo random noise sequences over which information bits are spread," and how that term relates to the claims. Additionally, Dr. Proakis may explain the references in the '802 patent to his book, *Digital Communications*, as well as the sections in the book referenced by the '802 patent. In offering testimony, Dr. Proakis relies on the understanding of the term "direct sequence spread spectrum code" by one of ordinary skill in the art, as well other evidence, including the patent specification, Dr. Proakis' book *Digital Communications* referenced in the patent specification, and the prosecution history. *See also* Exhibit A.

In addition to the above, Dr. Proakis may offer testimony in response or in rebuttal to any arguments or expert testimony offered by Wi-LAN.

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JOHN G. PROAKIS

Department of Electrical and Computer Engineering, UCSD
Department of Electrical and Computer Engineering, Northeastern University
email: jproakis@ucsd.edu proakis@ece.neu.edu

I. EDUCATION

BSEE, University of Cincinnati, 1959
MSEE, Massachusetts Institute of Technology, 1961
Ph.D. in Engineering, Harvard University, 1967

II. PROFESSIONAL EXPERIENCE

Dr. Proakis is an Adjunct Professor at the University of California at San Diego and a Professor Emeritus and Research Professor at Northeastern University. He was a faculty member at Northeastern University from 1969 through 1998 and held the following academic positions: Associate Professor of Electrical Engineering, 1969-1976; Professor of Electrical Engineering, 1976-1998; Associate Dean of the College of Engineering and Director of the Graduate School of Engineering, 1982-1984; Chairman of the Department of Electrical and Computer Engineering, 1984-1997.

His professional experience and interests are in the general areas of digital communications and digital signal processing and more specifically, in adaptive filtering, adaptive communication systems and adaptive equalization techniques, communication through fading multipath channels, radar detection, signal parameter estimation, communication systems modeling and simulation, optimization techniques, and statistical analysis. He is active in research in the areas of digital communications and digital signal processing and has taught undergraduate and graduate courses in communications, circuit analysis, control systems, probability, stochastic processes, discrete systems, and digital signal processing. He is the co-author of the books *Digital Communications* (New York: McGraw-Hill, 2008, 5th ed.), *Introduction to Digital Signal Processing* (Upper Saddle River, NJ: Prentice Hall, 2007, 4th ed.); *Digital Signal Processing Laboratory* (Englewood Cliffs: Prentice-Hall, 1991); *Advanced Digital Signal Processing* (New York: Macmillan, 1992); *Digital Processing of Speech Signals* (New York: Macmillan, 1992, IEEE Press, 2000); *Communication Systems Engineering*, (Upper Saddle River, NJ: Prentice Hall, 2002, 2nd ed.); *Digital Signal Processing Using MATLAB V.4* (Boston: Brooks Cole-Thomson Learning, 2007, 2nd ed.); *Contemporary Communication Systems Using MATLAB* (Boston: Brooks Cole-Thomson Learning, 2004, 2nd ed.); *Algorithms for Statistical Signal Processing* (Upper Saddle River, NJ: Prentice Hall, 2002); *Fundamentals of Communication Systems* (Upper Saddle River, NJ: Prentice Hall, 2005).

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Harvard University, 1990-91

Dr. Proakis was a Visiting Professor in the Division of Applied Sciences during his sabbatical.

III. MASSACHUSETTS INSTITUTE OF TECHNOLOGY, 1978-79

Dr. Proakis was a Visiting Professor in the Department of Electrical Engineering and Computer Science during his sabbatical.

General Telephone and Electronics Corporation, 1966-1969

Dr. Proakis joined GTE's subsidiary, Sylvania, in December 1966. At Sylvania, he was a project engineer on a research program that involved studies of adaptive equalization techniques for time-dispersive channels. In addition, he had major task responsibilities in several government funded programs in communications.

Harvard University, 1963-1966

During this period, Dr. Proakis was a research assistant and a teaching fellow in the Division of Engineering and Applied Physics. For his doctoral dissertation, he performed studies of adaptive reception of digital signals transmitted over random or unknown channels.

MIT Lincoln Laboratory, 1961-1963

As a staff member of Lincoln Laboratory, Dr. Proakis assisted in the construction and testing of a VLF experimental modem, utilizing spread spectrum techniques, intended for Navy data communications. He also performed theoretical studies on programs of data transmission over multipath channels and on methods for extracting a phase reference in phase-coherent digital signaling systems.

MIT Electronic Systems Laboratory, 1959-1961

While Dr. Proakis was a graduate student at MIT, he was also a research assistant in the Electronic Systems Laboratory. During this period he performed theoretical studies of sequential test procedures in radar detection.

AWARDS and HONORS

IEEE Fellow Award (1984); IEEE Signal Processing Society Education Award(2003); McGraw-Hill/Jacob Millman Award (2002); The Donald Fink Prize Award (2000), European Signal Processing Society Papoulis Award(2007).

IV. SELECTED PUBLICATIONS

Digital Communications, 2th Edition, McGraw-Hill Publishing Co., 1991

“Phase-Coherent Digital Communications for Underwater Acoustic Channels,” (with M. Stojanovic and J.A. Catipovic), **IEEE Journal of Oceanic Engineering**, 19, 100-111, January 1994.

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“Estimation and Equalization of Underwater Acoustic Channels using Cyclic Statistics,” (with Y. Constantinou and L. Tong), **Proceedings of the 1994 Workshop on Cyclostationary Signals**, Monterey, CA, August 1-2, 1994.

“Spatial Processing of Broadband Underwater Acoustic Communication Signals in the Presence of Co-channel Interference,” (with M. Stojanovic, Z. Zvonar and J.A. Catipovic) *Proc. OCEANS’94*, Brest, France, September 13-16, 1994.

“Optimal Tracking of Time-Varying Channels: A Frequency Domain Approach for Known and New Algorithms,” (with J. Lin, F. Ling, and H. Lev-Ari), **IEEE Journal on Selected Areas in Communications**, vol. 13, pp. 141-154, January 1995.

“Analysis of the Impact of Channel Estimation Errors on the Performance of Decision-Feedback Equalizer in Fading Multipath Channels,” (with M. Stojanovic and J.A. Catapovic), **IEEE Trans. Communications**, vol. 43, pp. 877-886, April 1995.

“Reduced-Complexity Spatial and Temporal Processing of Underwater Acoustic Communication Signals,” (with M. Stojanovic and J.A. Catapovic), **Journal of the Acoustical Society**, vol. 98, pp. 961-972, August 1995.

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“Coded Modulation Techniques for Cellular Mobile Systems,” (with M. Salehi) in **Worldwide Wireless Communications**, F.J. Barnes et al., Editor, pp. 215-238, International Engineering Consortium Publishers.

“Performance of a High Rate Adaptive Equalizer in a Shallow Water Acoustic Channel,” (with M. Stojanovic and J.Catipovic), **Journal of the Acoustical Society of America**, vol. 100, pp. 2213-2219, October 1996.

“A Comparison of Decision Feedback Equalization and Data Directed Estimation Techniques for the GSM System,” (with B. Bjerke, M.K. Lee and Z. Zvonar), **Proc. International Conference on Universal Personal Communications**, San Diego, CA, October 13-15, 1997.

“Reduced-Complexity Sequence Detection Approaches for PR-shaped Coded Linear Modulations,” (with A. Rizos), *Proc. IEEE GLOBECOM Conference*, pp. 342-346, Phoenix, AZ, November 3-8, 1997.

“Analysis of the Impact of Channel Estimation Errors on the Performance of a MC-CDMA System in a Rayleigh Fading Channel,” (with D.N. Kalofonos and M. Stajanovic), **Proc. IEEE**

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GLOBECOM Conference, Communication Theory Miniconference, pp. 213-217, Phoenix, AZ, November 3-8, 1997.

“Equalization Techniques for High-Density Magnetic Recording”, **IEEE Signal Processing Magazine**, Vol. 15, July 1998, pp. 73-82.

“Fading Channels: Information-Theoretic and Communications Aspects,” (with E. Biglieri and S. Shamai), **IEEE Trans. Information Theory**, Vol. 44, Oct. 1998, pp. 2619-2692.

“Spread Spectrum for Underwater Acoustic Communications,” (with M. Stojanovic and J. Rice), **Proc. IEEE Oceans '98**, Nice, France, September 8-11, 1998.

“On the Performance of Adaptive MMSE Detectors for a MC-CDMA System in Fast Fading Rayleigh Channels,” (with D.N. Kalofonos and M. Stojanovic), **Proc. 9th IEEE International Symposium on Personal, Indoor and Mobile Radio**, Boston, MA, September 1998.

“A Comparison of GSM Receivers for Fading Multipath Channels with Adjacent- and Co-Channel Interference,” (with B.A. Bjerke M.K. Lee and Z. Zvonar, **Proc. 9th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications**, Boston, MA, September 8-11, 1998.

“Incremental Quantization – A New Multiuser Detection Algorithm for CDMA Systems,” (with R. Mahadevappa), **Proc. CISS'99**, Baltimore, MD, March 1999.

“Direct Sequence Spread Spectrum Based Modem for Underwater Acoustic Communications and Channel Measurement,” (with E. Sozer and M. Stojanovic), **Proc. OCEANS'99**, Seattle, WA, September 1999.

“Multiple Antenna Diversity Techniques for Transmission over Fading Channels,” (with B. Bjerke), **Proc. WCNC'99**, New Orleans, LA, September 1999.

“Performance Comparisons of Concatenated Codes with Iterative Decoding for DS-SS Systems with Application to IS-95-based Systems,” (with D.N. Kalofonos and E. Kurtas), **Proc. WCNC'99**, New Orleans, LA, September 1999.

“Performance of Multi-Code CDMA Systems with Concatenated Coding and Iterative Decoding in Multipath Rayleigh Fading Channels,” (with D.N. Kalofonos and E. Kurtas), **Proc. VTC'99**, Amsterdam, The Netherlands, September 1999.

“Underwater Acoustic Networks,” (with E.M. Sozer and M. Stojanovic), **IEEE Journal of Oceanic Engineering**, vol. 25, pp. 72-83, January 2000.

“Multichannel Antenna Diversity Combining Techniques for Fading Multipath Channels,” (with B.A. Bjerke), **Proceedings 2000 Conference on Information Sciences and Systems**, Princeton, NJ, March 15-17, 2000.

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“High Rate Wireless Communications with Multiple Transmit and Receive Antennas,” **IEEE 2000 Communication Theory Workshop**, Orlando, Florida, May 8-10, 2000.

“Towards Robust Adaptive Acoustic Communications,” (with R.A. Benson and M. Stojanovic), **Proc. Oceans 2000 Conf.**, Providence, RI, September 11-14, 2000

“Antenna Diversity Combining Schemes for WCDMA Systems in Fading Multipath Channels,” (with B.A. Bjerke and Z. Zvonar), **Proc. Vehicular Tech. Conf.**, Boston, MA, September 25-28, 2000.

“Multiple Transmit and Receive Antenna Diversity Techniques for Wireless Communications,” (with B.A. Bjerke), **Proc. AS-SPCC Conf.**, Lake Louise, Alberta, Canada, October 1-4, 2000.

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“A Comparison of GSM Receivers for Fading Multipath Channels with Adjacent- and Co-channel Interference,” (with B.A. Bjerke, M.K. Lee and Z. Zvonar), **Journal of Selected Areas in Communications**, vol. 18, November 2000.

Communication Systems Engineering (with co-author M.Salehi), Second Edition, Prentice Hall, 2002.

Algorithms for Statistical Signal Processing (with co-authors C. Rader, F. Ling, C. Nikias, M. Moonen and I. Proudler), Prentice Hall, 2002..

“Iterative Decision Feedback Equalizer for Time-Dispersive Channels,” (with M. Marandian, M. Salehi, and F. Blackmon), **Proc. 2001 Conference on Information Sciences and Systems**, Johns Hopkins University, March 21-23, 2001.

“Signal Space Representation of Binary Continuous Phase Modulated Signals,” (with O. Dural), **Proc. VTC’2001**, Atlantic City, NJ, October 7-11, 2001.

“Comparison of Reduced Complexity Detectors for Continuous Phase Modulated Signals,” (with O. Dural), **Proc. VTC’2001**, Atlantic City, NJ, October 7-11, 2001.

“Iterative Equalization and Decoding Techniques for Shallow Water Acoustic Channels,” (with E. Sozer and F. Blackmon), **Proc. OCEANS’01**, Honolulu, HI, November 5-8, 2001.

“Performance Comparison of Iterative/Integral Equalizer/Decoder Structures for Underwater Acoustic Channels,” (with F. Blackmon, E. Sozer, M. Murandian, and M. Salehi), **Proc. OCEANS’ 01**, Honolulu, HI, November 5-8, 2001.

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“Performance of Adaptive MC-CDMA Detectors in Rapidly Fading Rayleigh Channels,” (with D. Kalofonos and M. Stojanovic), **IEEE Trans. On Communications**, vol. 3, pp. 229-239, March 2003.

“Mitigating Multiple Access Interference and Intersymbol Interference in Uncoded CDMA Systems with Chip-level Interleaving,” (with R. Mahadevappa), **IEEE Trans. On Wireless Communications**, vol.2, pp.781-792, October 2002.

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T. Wang, J. G. Proakis, and J. R. Zeidler, "Performance Analysis of High QAM OFDM System Over Frequency Selective Time-Varying Fading Channel," *Proc. PIMRC'03*, Beijing, China, September 8-11, 2003.

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P. Amihoud, L. B. Milstein and J. G. Proakis, "Channel Equalization for High Data Rate MIMO Systems," *Proc. MILCOM'03*, Boston, MA, October 13-16, 2003.

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J. Proakis and M. Salehi, "*Fundamentals of Communication Systems*, Upper Saddle River, NJ: Prentice-Hall, 2005.

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J. Proakis and M. Salehi, *Digital Communications*, 5th Edition, Dubuque, IA: McGraw-Hill, 2008