

WILLIAM HERNDON LEHR

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Biographical Description

Dr. William Lehr is an economist and industry consultant. He is a research associate in the Computer Science and Artificial Intelligence Laboratory (CSAIL) at the Massachusetts Institute of Technology, currently working with the Communications Futures Program (<http://cfp.mit.edu>), which is an industry-academic multidisciplinary research effort focused on road mapping the communications value chain. Previously, Dr. Lehr was the associate director of the MIT Research Program on Internet & Telecoms Convergence (ITC, <http://itc.mit.edu/>), and was an associate research scholar and assistant professor on the faculty of Columbia University's Graduate School of Business. Dr. Lehr's research focuses on the economics and regulatory policy of the Internet infrastructure industries. He teaches courses on the economics, business strategy, and public policy issues facing telecommunications, Internet, and eCommerce companies, and is a frequent speaker at international industry and academic conferences. He has published articles on such topics as the impact of the Internet on the structure of the communications infrastructure industries, telecommunications regulation, and the pricing of Internet services. He is currently engaged in research on the convergence of the Internet and telecommunication services and the implications for corporate strategy and public policy.

In addition to his academic research, Dr. Lehr provides litigation, economic, and business strategy consulting services for firms in the information technology industries. Dr. Lehr has advised information technology companies on strategic marketing, pricing, financial planning, and competitive strategy; and government agencies in the United States and abroad on telecommunications policy matters. Dr. Lehr has prepared expert witness testimony for both private litigation and for regulatory proceedings before the FCC and numerous state commissions.

Dr. Lehr holds a PhD in Economics from Stanford (1992), an MBA from the Wharton Graduate School (1985), and MSE (1984), BS (1979) and BA (1979) degrees from the University of Pennsylvania.

WILLIAM HERNDON LEHR
Curriculum Vitae

EDUCATION

Ph.D., Economics, Stanford University, 1992.

M.B.A., with distinction, The Wharton School, University of Pennsylvania, 1984.

M.S.E., Chemical Engineering, University of Pennsylvania, 1984.

B.S., Chemical Engineering, *cum laude*, University of Pennsylvania, 1979.

B.A., European History, *magna cum laude*, University of Pennsylvania, 1979.

Academic Honors: Graduate Student Research Award, Telecommunications Policy Research Conference, 1991; Lynde and Harry Bradley Foundation Fellowship, 1990; Stanford Fellowship, 1987

PROFESSIONAL EXPERIENCE

Computer Science and Artificial Intelligence Laboratory (CSAIL), Massachusetts Institute of Technology (Cambridge, MA), Research Associate, July 2006-present; previously, in Center for Technology, Policy and Industrial Development, MIT, 1997- June 2006. Working with MIT Internet Telecoms Convergence Consortium (1997-2004); Communications Futures Program (2004-present).

Graduate School of Business, Columbia University (New York, NY), Associate Research Scholar of Finance and Economics, 1997-2002; Assistant Professor of Finance and Economics, July 1991 to December 1996.

RAND Corporation (Santa Monica, CA), Graduate Student Intern, Summer 1990.

Economic Analysis Group, Ltd. (Washington, DC), Senior Consultant, 1985-1987.

M.C.I. Telecommunications (Washington, DC), Manager of Financial Analysis, 1985; Senior Financial Analyst, 1984.

Office of Management and Budget, National Security Division (Washington, DC), Graduate Student Intern, Summer 1983.

Putnam, Hayes and Bartlett (Cambridge, MA), Research Associate 1980-1982.

TEACHING EXPERIENCE

Communications & Information Policy
Internet Pricing and Quality of Service
Internet Commerce
Internet Economics 101

Internet Telephony Tutorial
Internet Commerce Video Course
Economics of Telecommunications Pricing
Economics and Strategy in Media Industries
Economics of Strategic Management
Managerial Economics
Telecommunications: Technologies and Policies in the Networked Digital World
Theory of the Firm (teaching assistant for Paul Milgrom)
Wireless Broadband in the Developing World

PAPERS and PUBLICATIONS

“Spectrum Pooling for Next Generation Public Safety Radio Systems,” with Nancy Jesuale, accepted for publication *IEEE Proceedings of the Dynamic Spectrum Access Networks (DySPAN2008) Conference*, Chicago, October 14-17, 2008.

“Running on Empty: the challenge of managing Internet addresses,” with Tom Vest and Eliot Lear, prepared for the 36th Research Conference on Communication, Information, and Internet Policy, George Mason University, Arlington, VA, September 26-28, 2008.

“Broadband Metrics Best Practices: Review and Assessment,” with Tony Smith-Grieco and Grace Rusi Woo, report prepared for Massachusetts Technology Collaborative/John Adams Innovation Institute (MTC/JAII), February 2008.

“Measuring Broadband: Improving Communications Policymaking through Better Data Collection,” with Kenneth Flamm, John Horrigan, and Amy Friedlander, Pew Internet & American Life Project, Washington, DC, November 2007.

“Coordinating User Behavior and Device Behavior in Wireless Grids,” with Lee McKnight and James Howison, in *Cognitive Wireless Networks*, edited by Fitzek, F. and M. Katz, Springer: The Netherlands, 2007.

“Study of Market-based Exclusive Spectrum Rights,” with Adrian Foster, Martin Cave, and Robert Jones, report prepared for Industry Canada, August 2007.

“Complexity of Internet Interconnections: Technology, Incentives and Implications for Policy,” with P. Faratin, D. Clark, P. Gilmore, and A. Berger, paper prepared for 35th Annual Telecommunications Policy Research Conference, George Mason University, September 2007.

Special Issue on Network Neutrality, co-edited with Jon Peha and Simon Wilkie, *International Journal of Communication* (volume 1, 2007), August 2007 (available at <http://ijoc.org/ojs/index.php/ijoc/issue/view/1>).

“Introduction: The State of the Debate on Network Neutrality,” with Jon Peha and Simon Wilkie, *International Journal of Communication* (volume 1, 2007), August 2007, pages 8-20 (available at <http://ijoc.org/ojs/index.php/ijoc>).

"Scenarios for the Network Neutrality Arms Race," with Marvin Sirbu, Jon Peha, and Sharon Gillett, *International Journal of Communication* (volume 1, 2007), August 2007, pages 8-20 (available at <http://ijoc.org/ojs/index.php/ijoc>) (paper originally presented at the 34th Annual Telecommunications Policy Research Conference, George Mason University, September 2006.)

"The Effects of Broadband Deployment on Output and Employment: A Cross-sectional Analysis of U.S. Data," with Robert Crandall and Robert Litan, *Issues in Economic Policy*, The Brookings Institution, Number 6, July 2007 (available at: <http://www.brookings.edu/views/papers/crandall/200706litan.htm>)

"The path to market success for dynamic spectrum access technologies," with John Chapin, *IEEE Communications Magazine*, May 2007.

"Time-limited Leases for Innovative Radios," with John Chapin, *IEEE Communications Magazine*, June 2007.

"Overlay Networks and Future of the Internet," with David Clark, Steve Bauer, Peyman Faratin, Rahul Sami, and John Wroclawski, *Communications and Strategies*, no. 63 (3rd Quarter 2006) 1-21.

"The Role of Unlicensed in Spectrum Reform," mimeo, MIT, Spring 2005.

"Measuring Broadband's Economic Impact," with Sharon Gillett, Carlos O'sorio, and Marvin Sirbu, *Broadband Properties*, vol. 24, no. 12 (Revised January 2006) 12-24.

"Managing Access to a Spectrum Commons," with Jon Crowcroft, accepted for publication *IEEE Proceedings of the Dynamic Spectrum Access Networks (DySPAN2005) Conference*, Baltimore, MD, November 2005.

"The Growth of Internet Overlay Networks: Implications for Architecture, Industry Structure and Policy," with David Clark, Peyman Faratin, Rahul Sami, and John Wroclawski, paper presented at the 33rd Annual Telecommunications Policy Research Conference, George Mason University, September 2005.

"Evolving Wireless Access Technologies for Municipal Broadband," with Marvin Sirbu and Sharon Gillett, *Government Information Quarterly*, 23 (2006) 480-502.

"Wireless is Changing the Policy Calculus for Municipal Broadband," with Marvin Sirbu and Sharon Gillett, *Government Information Quarterly*, 23 (2006) 435-453

"Measuring Broadband's Economic Impact," with Sharon Gillett, Marvin Sirbu, and Carlos Osorio, paper presented at the 33rd Annual Telecommunications Policy Research Conference, George Mason University, September 2005.

"The Role of Unlicensed in Spectrum Reform," draft mimeo, Massachusetts Institute of Technology, March 2005.

"Broadband Open Access: Lessons from Municipal Network Case Studies," with Marvin Sirbu and Sharon Gillett, paper presented at the 32nd Annual Telecommunications Policy Research Conference, George Mason University, September 2004.

"The Municipal Role in U.S. FTTH Market Growth," with Sharon Gillett and Carlos Osorio, prepared for the FTTH Council's 3rd Annual FTTH Conference and Expo, October 4-6, 2004, Orlando, FL.

"Municipal Electric Utilities' Role in Telecommunications Services," with Sharon Gillett and Carlos Osorio, *Telecommunications Policy*, vol 30, issue 8-9 (September-October 2006) 464-480.

"Municipal Wireless Broadband: Policy and Business Implications of Emerging Access Technologies," with Marvin Sirbu and Sharon Gillett, paper prepared for "Competition in Networking: Wireless and Wireline," London Business School, April 13-14, 2004.

"Wireless Broadband: Coming to a Town Hall Near You?" MIT Technology Insider, August 2004.

"Local Government Broadband Initiatives," with Sharon Eisner Gillett and Carlos Osorio, *Telecommunications Policy*, 28 (August 2004) 537-558.

"Economic Case for Dedicated Unlicensed Spectrum Below 3GHz," paper prepared for New America Foundation Conference, April 2004.

"TELRIC and the Cost of Capital," with R. Glenn Hubbard, white paper prepared on behalf of AT&T for *ex parte* submission to the FCC, December 2003.

"Coordinating User and Device Behavior in Wireless Grids," with Lee McKnight and James Howison, draft paper, Syracuse University, October 2003.

"Local Government Broadband Initiatives," with Sharon Eisner Gillett and Carlos Osorio, paper prepared for the 31st Annual Telecommunications Policy Research Conference, George Mason University, September 2003.

"Economic Case for Voluntary Structural Separation," with R. Glenn Hubbard, paper prepared for the 31st Annual Telecommunications Policy Research Conference, George Mason University, September 2003.

"Software Radio: Implications for Wireless Services, Industry Structure, and Public Policy," with Sharon Gillett and Fuencisla Merino, *Communications and Strategies*, IDATE, Issue 49 (1st Quarter 2003) 15-42.

"Wireless Internet Access: 3G vs. WiFi?," with Lee McKnight, *Telecommunications Policy*, 27 (2003) 351-370.

"Local Government Stimulation of Broadband: Effectiveness, E-Government, and Economic Development," with David Clark, Sharon Gillett, Marvin Sirbu, and Jane Fountain, A White Paper Prepared from A Proposal to the U.S. National Science Foundation Program on Digital Government, Massachusetts Institute of Technology, November 7, 2002.

"Stimulating Investment and the Telecommunications Act of 1996," with Robert Willig, John Bigelow, and Stephen Levinson, white paper prepared on behalf of AT&T, October 2002.

Cyber Policy and Economics in an Internet Age, co-edited with Lorenzo Pupillo, Kluwer Academic Press: Norwell, MA, November 2002.

"Optical Networks and the Future of Broadband Services," with Pedro Ferriera and Lee McKnight, *Technological Forecasting and Social Change*, 69 (2002) 741-758.

"Show Me the Money: Contracts and Agents in Service Level Agreement Markets," with Lee McKnight, *info*, vol. 4, no. 1 (2002) 24-36.

"Promoting Broadband Investment and Avoiding Monopoly," with Robert Hall, white paper prepared on behalf of AT&T, February 2002.

"Best Effort versus Spectrum Markets: Wideband and Wi-Fi versus 3G MVNOs?" with Raymond Linsenmayer and Lee McKnight, forthcoming in Proceedings of the 29th TPRC: Research Conference on Information, Communication, and Internet Policy, edited by Shane Greenstein and Lorrie Cranor.

"The Disruptive User – Internet Appliances and the Management of Complexity," with Sharon Gillett, David Clark, and John Wroclawski, *BT Technology Journal*, Vol. 19, No. 4 (October 2001) 40-45.

"Rescuing Competition to Stimulate Telecom Growth," with Robert Hall, white paper prepared on behalf of AT&T, October 2001.

"Do Appliances Threaten Internet Innovation?" with Sharon Gillett, David Clark, and John Wroclowski, *IEEE Communications Magazine*, vol. 39, no. 10 (October 2001) 46-51.

"No Optical Illusion: A market for Bandwidth is Emerging," with Lee McKnight, *WorldLink*, World Economic Forum, May/June 2001.

Book Review of *Letting Go: Deregulating the Process of Regulation* by Alfred Kahn, *Journal of Economic Literature*, vol. XXXIX (September 2001) 943-944.

"Competition in Telecommunications and Economic Growth," with Jim Glassman, report prepared for TechCentral Station, July 2001.

"The Economics of the Tausin-Dingell Bill: Theory and Evidence," with Jim Glassman, report prepared for TechCentral Station, June 2001.

"Assessing the Cost of Capital for a Standalone Transmission Company," with Michael Cragg and Ron Rudkin, *The Electricity Journal*, Volume 14, Issue 1, January-February 2001, Pages 80-88.

Internet Telephony, (co-edited with David Clark and Lee McKnight), Cambridge, MA: MIT Press, 2001.

"A New Theory of the Internet Firm," in Creative Destruction: Business Strategies for the Global Internet, edited by Lee McKnight, Paul Vaaler, and Raul Katz, Cambridge, MA: MIT Press, 2001.

"A Taxonomy of Internet Appliances," with Sharon Gillett, David Clark, and John Wroclowski, paper presented to the Twenty-Eighth Annual Telecommunications Policy Research Conference, September 25-27, 2000, Alexandria, VA

"A Broadband Access Market Framework: Towards Consumer Service Level Agreements," with Lee McKnight, paper presented to the Twenty-Eighth Annual Telecommunications Policy Research Conference, September 25-27, 2000, Alexandria, VA

"The Tax on Talking Is a Luxury We Can No Longer Afford," with R. Glenn Hubbard, paper prepared for submission to the U.S. Senate, May 2000.

"Telecommunications, the Internet, and the Cost of Capital," with R. Glenn Hubbard, in The Internet Upheaval, edited by Ingo Vogelsang and Ben Compaine, MIT Press: Cambridge, 2000.

“Rapporteur's Report: Next Generation Internet Policy Workshop,” MIT Internet & Telecoms Convergence Consortium, http://itc.mit.edu/rpcp/NGIPolicy/rap_final.html, September 1999.

"Provisioning for Bursty Internet Traffic: Implications for Industry Structure," with David Clark, paper presented to Workshop on Internet Service Quality Economics, Massachusetts Institute of Technology, December 2-3, 1999, Cambridge, MA

"Availability of Broadband Internet Access: Empirical Evidence," with Sharon Gillett, paper presented to the Twenty-Seventh Annual Telecommunications Policy Research Conference, September 25-27, 1999, Alexandria, VA

"Telecommunication Regulation in the United States and Europe: The Case for Centralized Authority," with Thomas Kiessling," in *Competition, Regulation and Convergence: Trends in Telecommunications Policy Research*, S. E. Gillett and I. Vogelsang (Eds.), Lawrence Erlbaum Associates, Mahwah, NJ, 1999.

“The Flexible Specialization Path of the Internet,” with Petros Kavassalis, in *Convergence in Communications and Beyond*, edited by Erik Bohlin, Karolina Brodin, Anders Lundgren, and Bertil Thorngren, Amsterdam: Elsevier Science, October, 2000.

"Next Generation Bandwidth Markets," with Lee McKnight, Communications & Strategies, Number 32, 4th Quarter 1998, 91-106.

“Forces for Integration and Disintegration in the Internet,” with Petros Kavassalis, Communications and Strategies, Number 30, 2nd Quarter 1998, 135-154.

“Computer Use and Productivity Growth in Federal Government Agencies, 1987-92”, with Frank Lichtenberg, Journal of Industrial Economics, Volume XLVI, Number 2, June 1998, 257-279.

“Understanding Vertical Integration in the Internet,” mimeo, paper presented to Euro CPR '98 Conference, Venice, April 1998.

“Improving Local Exchange Competition: Regulatory Crossroads,” with R. Glenn Hubbard, mimeo, Columbia University, February 1998.

"Information Technology and Its Impact on Productivity: Firm-level Evidence from Government and Private Data Sources, 1977-1993," with Frank Lichtenberg, Canadian Journal of Economics, volume 32, No. 2, April 1999, pages 335-362.

"The Political Economy of Congestion Charges and Settlements in Packet Networks," with Martin Weiss, Telecommunications Policy, 20(3), April 1996, pages 219-31.

"Compatibility Standards and Industry Competition: Two Case Studies", Economics of Innovation and New Technology, 4(2), 1996, pages 97-112.

"Compatibility Standards and Interoperability: Lessons from the Internet", in Standards Policy for Information Infrastructure, edited by B. Kahin and J. Abbate, Harvard Information Infrastructure Project, Cambridge MA: MIT Press, 1995.

Quality and Reliability of Telecommunication Infrastructure (editor), Hillsdale, NJ: Lawrence Erlbaum Associates, 1995.

"The Quality of Complex Systems and Industry Structure", with Nicholas Economides, in Quality and Reliability of Telecommunication Infrastructure, edited by William Lehr, Hillsdale, NJ: Lawrence Erlbaum Associates, 1995.

"Repeated Contract Negotiations with Private Information: Comment," Japan and the World Economy, 7(4), November 1995, pages 473-74.

"Quality Choices in a Network of Networks", in *Private Networks and Public Objectives*, edited by E. Noam and A. NíShúilleabháin, North Holland: New York, 1996.

"ISDN in the U.S.A.: Is it Arriving at Last?", in *ISDN: An International Comparison of Trends in the USA, Japan, Singapore and Europe*, Final Report to the ISDN Commission of North Rhine-Westphalia, May 1996.

"Compatibility Standards and the Internet", Graduate School of Business, Columbia University, working paper, September 1992.

"Standardization: Understanding the Process", Journal of the American Society for Information Science, vol 43, no 8 (September 1992) 550-555.

"Voluntary Standards, Multiple Markets, Standards Institutions, and Industry Structure", Graduate School of Business, Columbia University, working paper, July 1992.

"ISDN and the Small User: Regulatory Policy Issues", with Roger Noll, in Integrated Broadband Networks: the Public Policy Issues, edited by Martin Elton, North-Holland, New York, 1991, 147-178.

"Incremental Costs and the Efficient Pricing of Local Exchange Services: A Synopsis of the Incremental Cost Conference", Center for Economic Policy Research Working Paper #175, Stanford University, January 1990.

"Vertical Integration in the Cable Television Industry: the Issue of Content/Carrier Separation", WD-5100-MF, RAND Corporation, Santa Monica, CA, August 1990.

"ISDN: an Economists' Primer to a New Telecommunications Technology",
working paper, February 1989.

"Economics of Anticipatory Standard Setting", working draft, presented at the
European Association of Research in Industrial Economics (E.A.R.I.E.)
Conference, Chania, Crete, September 1994.

"Political Economics of Voluntary Standard Setting", Graduate School of Business,
Columbia University, working draft, January 1992.

