

Curriculum Vita

Timothy D. Schoechle, Ph.D.

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GOALS AND INTERESTS

Engineering and development of advanced renewable energy-related consumer electronic and communication network technologies, standards, products, and systems. Research and writing on energy and technology policy including related economic development, political, environmental, and social issues.

Research, education, and consulting in standardization, innovation, and intellectual property rights—utilizing my unique international background in both engineering and in public policy.

Innovation, entrepreneurship, and business development.

EDUCATION

Ph.D. in Communication: School of Journalism and Mass Communication, University of Colorado, Boulder, 2004.

Dissertation topic: “The Privatization of Standardization: Enclosure of Knowledge and Policy in the Age of Digital Information.” Conducted dissertation research on current issues in the international standardization system, including research supporting public access, democratic discourse, and consensus.

Master of Science in Telecommunications: Interdisciplinary Telecommunications Program, College of Engineering and Applied Science, University of Colorado, Boulder, 1995.

Thesis topic: “Emerging Consumer Policy Issues on the Information Highway.” Conducted research on consumer privacy as impacted by technology and standards.

Certificate: Teacher Training Certificate: Graduate Teacher Program, University of Colorado, Boulder, 2001.

Graduate Coursework in Public Policy: Graduate School of Public Affairs, University of Colorado, Boulder, 1978.

Bachelor of Science in Administrative Science, School of Management, Pepperdine University, Malibu, CA, 1973.

EMPLOYMENT AND CONSULTING

Founder, President and CEO, Smarthome Laboratories, Ltd., Boulder, CO (1990–present)

Engineer and develop gateways, control system software, smart appliances, IoT devices, and consumer electronics for energy management and the integration of solar energy generation and storage in homes and small buildings. Develop and support technical standards for such systems and equipment.

Principal Investigator for Boulder Energy Challenge grant-funded *Solar-plus-Storage Demonstration Project* connecting batteries, solar PV, inverters, electric vehicles, and smart appliances for City of Boulder for grid-connected and behind-the-meter energy storage and management—including interface to utility demand response and advanced “transactive energy” applications.

Secretary, ISO/IEC SC25/WG1—international standards committee for *Interconnection of Information Technology Equipment—Home Electronic Systems*—of the Joint Technical Committee 1 (JTC1) for *Information Technology* of ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission), Geneva, Switzerland; for Telecommunications Industry Association, U.S. Technical Advisory Group Secretariat on behalf of ANSI (American National Standards Institute), New York, NY, (1990–present).

Manage, organize, and coordinate all technical work related to communication networks and external interfaces for homes and buildings. Serve as Project Editor for international standards related to premises gateways and application platforms for related to premises-based energy devices and systems for the use, generation, and storage of electricity, including liaison with all standards bodies, standards-related groups, and consortia working on “smart grid” related activities.

Founder, President & CEO, CyberLYNX Gateway Corporation, Boulder, CO (1992–present)

Developed international standards-based premises hardware/software platforms for energy management and integration of solar-plus-storage electric power applications and interface to external smart grid platforms and applications.

Secretary, ISO/IEC SC32—international standards committee for *Data Management and Interchange*—of the Joint Technical Committee 1 (JTC1) for *Information Technology* of ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission), Geneva, Switzerland; for France Inc., SC32 Secretariat on behalf of ANSI (American National Standards Institute), New York, NY, (2006–2015).

Managed, organized, and coordinated all technical work, international meetings, and the flow of technical and administrative documents, including issuance of international ballots, standards, and technical reports, on behalf of the United States as Secretariat for Subcommittee 32—*Data Management and Interchange*.

Faculty, CSU Global Campus (Colorado State University), Greenwood Village, CO (2013–present).

Graduate and undergraduate course development in information technology/cyber security and privacy

Expert Witness—specializing in litigation support regarding patents and standards policies and practices, and regarding patent validity, on behalf of various international law firms (details upon request) (2003–present).

Director, ICSR (International Center for Standards Research), University of Colorado, Boulder, CO (2000–2004).

Conducted academic research, organized local, national, and international conferences and supported student and faculty research papers on international standards and standardization practice.

Graduate Faculty Adjunct, Interdisciplinary Telecommunications Program, College of Engineering and Applied Science, University of Colorado, Boulder, CO (1997–2004).

Developed and taught graduate level courses (*i.e.* Telecom Standards, Future of Telecom, Management and Information Technology). Managed, conducted, and lectured at weekly interdisciplinary seminars. Sat on graduate thesis committees, advised students, and conducted special academic events.

Technical Staff, Broadband Access Evolution, US WEST Advanced Technology, US WEST/Qwest (1998–2000).

Conducted research and developed technical strategies for consumer broadband access technologies including DSL and Satellite. Initiated standardization of the residential gateway (ISO/IEC 15045).

Graduate Faculty Adjunct, MSCIT (Master of Computer and Information Technology) Program, Regis University, Denver, CO (1996–present).

Taught graduate level courses on WAN (Wide Area Networking) Technology (*e.g.*, Internet, ISDN, TCP/IP, Sonet, ATM, X.25, *etc.*) and on Presentation of Technical Material.

Faculty, SK Telecom, Global Training Program, University of Colorado, Boulder, CO (1996–1997).

Lectured on computer telephony, on technical standards, and on the history and organization of the international standardization system in special graduate level management training program for a SK Telecom (formerly Korea Mobile Telecom) major Korean telecom operator.

Founder, Director of R&D, CyberLYNX Computer Products Inc., Boulder, CO (1983–1991)

Developed innovative home automation and personal computer products, home networks (PLC—Power Line Carrier), protocol standards (CEBus), and residential gateways for energy management, entertainment, security, and other consumer electronics applications.

Founder, Chairman, VP Finance, VP Engineering, BI Incorporated, Boulder, CO (1978–1983).

Founded design firm for innovative microprocessor and local area network (LAN) technology and industrial products. Invented (patented) and manufactured the first passive RFID tag. Developed telephone for the disabled using speech recognition and synthesis.

Independent Consultant, Q-Designs, Boulder, CO (1977–1978)

Developed software for variety of industrial and low-cost consumer products (*e.g.*, watches, calculators, games, control systems, *etc.*) based on 4-bit microprocessors.

Applications Engineer, NEC Microcomputers, Inc., Lexington, MA (1975–1977).

Introduced new line of microprocessor, peripheral, and memory chips for major Japanese semiconductor house. Assisted customers in conceptualizing and developing their products.

Software Engineer, Identicon Corporation, Franklin, MA (1973–1975).

Pioneered the development of microprocessor-based bar code scanners and readers. Developed algorithms and software for first microprocessor based UPC (Universal Product Code) scanner and verifier.

PROFESSIONAL SOCIETIES AND ORGANIZATIONS

Senior Fellow, National Institute for Science, Law and Public Policy (NISLAPP), Washington, DC. (2013–present).

Expert, Special Standards Evaluation Panel on Intelligent Transportation Systems (ITS) for the Transportation Research Board (TRB), National Academies, Washington, DC. (2006–2007).

Director, ICSR (International Center for Standards Research), University of Colorado, Boulder CO, (1998–2004).

Secretary and US Expert, ISO/IEC JTC1 SC25/WG1, international standards committee for Home Electronic System, (1990–present) Joint Technical Committee 1 for Information Technology of ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission), Geneva, CH; and representing the United States and the TIA (Telecommunications Industry Association), Arlington, VA (1990–present).

Secretary, US Technical Advisory Group for ISO/IEC JTC1 SC25 WG1 for ANSI (American National Standards Institute), NY (1990–present).

Executive Board (on behalf of Farance Inc.), INCITS (International Committee for Information Technology Standards), sponsored by ITIC (Information Technology Industry Council), Washington, DC (2003–present).

International Organizing Committee, biennial SIIT Conference (Standardization and Innovation in IT) (1999–present).

Editorial Board, JITSR (International Journal for IT Standards and Standardization Research) (2001–present).

Member, ANSI Education Committee, (2003–present).

Member, ANSI Patent Committee, ANSI Intellectual Property Group (2004–present).

Participant, ANSI International Advisory Group, *ad hoc* working group on personal data & privacy (1997–present).

Participant, IISP (Information Infrastructure Standards Panel) representing the EIA CEBus (Consumer Electronic Bus) Committee, formed in 1994, sponsored by ANSI (1994–1996).

Participant, EIA/NCTA (National Cable Television Association) JEC (Joint Engineering Committee) (1994–1998).

US Delegate, IEC SC77A WG3 committee on powerline signaling standards, sponsored by IEC (International Electrotechnical Commission) Geneva, CH, representing the U.S. and the EIA (1990–1998).

Life Member, IEEE and the IEEE Communications Society (1994–present).

Member, IEEE Standards Association (2000–present).

Member, Standards Engineering Society, (2000–present).

Member, EIA CEBus Committee, sponsored by EIA (1984–1994). *Chair* of the Powerline Communications Subcommittee (1987–1994). Elected *Vice Chairman* of the CEBus Technical Steering Committee, Nov. 1994.

Chair, TR41.5.2 (Residential Gateway Software Committee) TIA (Telecommunications Industry Association), Arlington, VA (1998–1999).

PARTICIPATION: CONFERENCES, PROFESSIONAL FORUMS, TRADESHOWS (partial)

Re-Inventing Wires: Municipal Fiber—Commonwealth Club of San Francisco 2/5/2018 speaker and panelist

Grid-Interop 2012, GridWise Architecture Council, Irving, TX, 12/12 paper presenter

Grid-Interop 2011, GridWise Architecture Council, Phoenix, AZ, 12/11 paper presenter

Grid-Interop 2010, GridWise Architecture Council, Chicago, IL, 12/10 paper presenter

Grid-Interop 2009, GridWise Architecture Council, Denver, CO, 11/09 keynote, paper presenter

Grid-Interop 2008, GridWise Architecture Council, Atlanta, GA, 11/08 paper presenter

Grid-Interop 2007, GridWise Architecture Council, Albuquerque, NM, 11/07 paper presenter

SIIT 2007 5th IEEE Standardization and Innovation in Info Tech, U. Calgary, CA 10/07 organizer

Conference on Standards Bodies & Patent Pools, Washington DC, US 10/12–13/06 speaker & panelist

Int'l Workshop for Binary CDMA & Wireless Netw'k Standards, Seoul, Korea 10/05 invited guest speaker

SIIT 2005 4th Standardization and Innovation in Info Tech, Geneva, ITU-T, CH 10/05 organizer, speaker

Getting Smarter about the Smart Grid—Commonwealth Club of San Francisco 1/13 speaker and panelist

ANSI Conf. on Int'l Leadership in ISO/IEC Committees, Scottsdale, AZ, US 12/04 participant

EISTA '04 (Int'l Conf. on Education & Info. Systems), Orlando, FL, US 7/04 speaker, panelist

International roundtable on standards policy, Stanhope Cntr, Cotswolds, UK 10/03 invited participant

SIIT 2003 3rd IEEE Standardization and Innovation in Info Tech, U. Delft, NL 10/03 organizer, speaker

Special Colloquium on Enclosure of Standardization, RegTP, Bonn, DE 3/02 invited guest speaker

First Networking Conf. on Industrial Stds Activity Promotion, Seoul, KR 12/02 speaker, panelist

International Workshop on Smart Home, Seoul, KR 12/02 speaker

Ist Networking Conf. on Ind. Stds Activity Promo' in Korea, Seoul, KR 12/02 keynote speaker

EASST 2002 European Ass'n for the Study of Science & Society, York, UK 7/02 speaker

SIIT 2001 2nd IEEE Standardization and Innovation in IT, Boulder, U. Co., CO, US 10/01 general chair, co-author

SES Annual Conference, (Standards Engineering Society), Denver, CO, US 8/01 speaker

EURAS Workshop on Standards, Compatibility & Infrastructure, Delft, NL '01 speaker

CONNECTIONS 2000 (home networks & gateways) San Diego, CA, US 5/00 speaker, panelist

CONNECTIONS 99 (home networks & gateways) Vancouver, Canada 5/99 speaker, panelist

SIIT 99 1st IEEE Standardization and Innovation in Info Tech, U. Aachen, DE 9/99 speaker

2nd Int'l Workshop on Standardization Research, Hamburg, DE 6/99 speaker

CFP2000 Computers, Freedom & Privacy Conference, Toronto, Canada 4/00 speaker, panelist

SuperPhones (Wireless) Conference, San Francisco, CA, US 1/97 speaker

GII Standards Seminar, ITU/ISO/IEC, Geneva, CH 1/96 speaker, panelist

Re-thinking State and Local Telecoms Policy, CU Boulder, CO, US '95 participant

Society and the Future of Computing, Durango, CO, US 6/95 poster, fellowship

National Consumer League, Annual Conference, Denver, CO, US 6/95 panelist, speaker

National Telecommunications Forum #3, 11/94 panelist, moderator

Conference on Privacy and Info Technology, CU Boulder, CO, US '94 presenter

New Television Conference, CU Boulder, CO, US '93 participant

EURODOMOTIQUE (home automation conference) Paris, FR '93 panelist, presenter

NAHB (National Association of Home Builders) Atlanta, GA, US '87 paper, panelist

ICCE (Int'l Conference on Consumer Electronics) Chicago, IL, US '92 paper

IEEE PES T&D (Power Eng. Soc., Transmission & Distribution) Dallas, US '91 panelist, presenter

ICCE (Int'l Conference on Consumer Electronics) Chicago, IL, US '90 paper presenter

FORUM '90 (Parks Assoc. home automation conference) Phoenix, AZ, US paper presenter

Domotique '90 (home automation conference) Paris, FR paper presenter

NAHB '84–'90 (National Association of Home Builders) Atlanta, GA, US participant, exhibitor

Domotique '88, (home automation conference) Paris, FR paper presenter

FORUM '88 (Parks Assoc. home automation conference) Dallas, TX, US presenter

IDATE '87 (telecommunications conference) Montpellier, FR paper presenter

<i>ISHA '87</i> (Int'l Symposium on Home Automation) Osaka, Japan	participant
<i>COMDEX '84-'86</i> Las Vegas, NV, US	participant, exhibitor
<i>ICCE '86</i> (Int'l Conference. on Consumer Electronics) Chicago, IL, US	participant
<i>FORUM '86</i> (Parks Assoc. home automation conference) Phoenix, AZ, US	participant
<i>CES '84-'91</i> (Consumer Electronics Show) Chicago, IL, US	participant, exhibitor
<i>IAETC '84</i> (Int'l Appliance Engineering Tech. Conference) Ohio State University, US	paper (& award)

HONORS AND RECOGNITIONS

Invited into *Kappa Tau Alpha*, the National Honor Society in Journalism and Mass Communication in 2001.

COMMUNITY SERVICE

Director, *Colorado Music Festival*, Board of Directors. 1991-2016

PUBLICATIONS

- Timothy Schoechle. "Hidden in Plain Sight—Ready or Not!" *Solar Today*. Summer, 2021. p. 24-28. <<http://www.solartoday.org/digital-issues>>
- Timothy Schoechle. "Intelligent Energy: Operating System for the Solar Homes and Microgrids of the Future." *Solar Today*. Fall, 2020. p. 18-23. <<http://www.solartoday.org/digital-issues>>
- Timothy Schoechle. "Distributed or Centralized PV? Rooftop vs. Utility-Scale." *Solar Today*. Summer, 2018. p. 25-28. <<http://www.solartoday.org/digital-issues>>
- Timothy Schoechle. *Re-Inventing Wires: The Future of Landlines and Networks*. National Institute for Science, Law and Public Policy. Washington, DC. 143 pages. <<http://www.gettingsmarteraboutthesmartgrid.org>>
- Timothy Schoechle. "Solar + Storage." *Solar Today*. Summer, 2017. p. 36-38. <<http://www.solartoday.org/digital-issues>>
- Timothy Schoechle. *Barriers to Distributed Solar: Solar Production Meters and Solar-Plus-Storage: shaping the future of rooftop solar in Colorado.* Boulder, Colorado: Smarhome Laboratories, Ltd. June 1, 2016. 22 pages.
- Timothy Schoechle. "Community Solar: The Utility of the Future." *Solar Today*. May/June, 2015. 3 pages. <<http://www.solartoday.org/digital-issues>>
- Timothy Schoechle. *The Hudson Valley "Energy Highway": An idea whose time has passed?*. Washington, DC: National Institute for Science, Law and Public Policy. June, 2015. 40 pages. <<http://www.gettingsmarteraboutthesmartgrid.org>>
- Timothy Schoechle and James Turner. "Peak Oil Redux: A Structural Transformation of the Energy Economy?" *Solar Today*. March/April, 2015. page 9. <<http://www.solartoday/digital>>
- Timothy Schoechle. (paper review), *A review of "The Future of the Grid—Evolving to Meet America's Needs" Report by the GridWise Alliance and the U.S. Department of Energy, Office of Electricity*". Washington, DC: National Institute for Science, Law and Public Policy. March, 2015. 5 pages. <<http://www.gettingsmarteraboutthesmartgrid.org>>
- Timothy Schoechle. *Green Electricity or Green Money?: Why some environmental groups hamper clean energy*. Washington, DC: National Institute for Science, Law and Public Policy. November, 2014. 23 pages. <<http://www.gettingsmarteraboutthesmartgrid.org>>
- Timothy Schoechle. (book review), *Power Struggle: The Hundred-year War Over Electricity*. 2013. 3 pages. <<http://www.gettingsmarteraboutthesmartgrid.org>>
- David Cohen, Ben Kroposki, and Timothy Schoechle. "The Energy Systems Integration Facility (ESIF): A Smart Power Platform for Product Interoperability Development, Test, and Evaluation." *Grid-Interop 2012*. (U.S. Department of Energy; Pacific Northwest National Laboratory). December 4–6, 2012, Irving, Texas. 5 pages.
- Timothy Schoechle. *Getting Smarter About the Smart Grid*. National Institute for Science, Law, and Public Policy, Washington, DC. November, 2012. 53 pages. <<http://www.gettingsmarteraboutthesmartgrid.org>>
- Timothy Schoechle, project editor. ISO/IEC 15045-2:2012. *Information technology—Home electronic system (HES) gateway—Part 2: Modularity and protocol*. Geneva: International Organization for Standardization/International Electrotechnical Commission. 39 pages.

Nathan Johnson, Peter Lilienthal, and Timothy Schoechle. "Modeling distributed premises-based renewables integration using HOMER." *Grid-Interop 2011*. (U.S. Department of Energy; Pacific Northwest National Laboratory). December 5–8, 2011, Phoenix, Arizona. 6 pages.

Timothy Schoechle. "Modular power manager and gateway: an approach to home-to-grid energy management and demand response." *Grid-Interop 2010*. (U.S. Department of Energy; Pacific Northwest National Laboratory). December 1–3, 2010, Chicago, Illinois. 12 pages.

Timothy Schoechle. "Energy management home gateway and interoperability standards." *Grid-Interop 2009*. (U.S. Department of Energy; Pacific Northwest National Laboratory). November 17-19, 2009, Denver, Colorado. 6 pages.

Timothy Schoechle. *Standardization and Digital Enclosure: The Privatization of Standards, Knowledge, and Policy in the Age of Global Information Technology*. (Information Science Reference series) Hershey, PA and New York, NY: IGI Global. 2009. 358 pages. (hardback).

Timothy Schoechle. "Book Review," *Standards Engineering*. Vol. 58, No. 6; November/December 2006, pp. 22-23. [review of *Advanced Topics in Information Technology Standards and Standardization Research: Volume 1*. by Kai Jakobs. Idea Group Publishing. 2006].

Timothy D. Schoechle. *The Privatization of Standardization: Enclosure of Knowledge and Policy in the Age of Digital Information*. Doctoral Dissertation, University of Colorado, Boulder, CO, US. February 9, 2004. 313 pages.

Timothy D. Schoechle. "Digital Enclosure: The Privatization of Standards and Standardization." *SIIT 2003—3rd IEEE Conference on Standardization and Innovation in Information Technology*. Technical University of Delft, The Netherlands, October 22-24, 2003, pp. 229-240.

Timothy D. Schoechle. "Re-examining Intellectual Property Rights in the Context of Standardization, Innovation and the Public Sphere." *Knowledge, Technology, and Policy*. Vol. 13, No. 3, Fall 2001, pp. 109-126.

Timothy D. Schoechle, Stephen Shapiro, Barnaby Richards, and Michael Rinow. "Evolving Approaches to Technical Standardization: Hybrid Standards Setting," *Proceedings: EASST 2002 Conference, European Association for the Study of Science and Technology*. University of York, York, UK. July 30–August 3, 2002.

Timothy D. Schoechle. "Intellectual Property Rights, Innovation and Standardization: Friends or Foes?" Koen Dittich and Tineke M. Egyedi (eds.), *Standards, Compatibility and Infrastructure Development: Proceedings of the 6th EURAS Workshop, 28-29 June 2001, Delft, The Netherlands*. European Academy for Standardization, Wroclaw. 2001. pp. 203-215.

Timothy D. Schoechle and Carson B Wagner (eds.). *SIIT 2001 Proceedings: 2nd IEEE Conference on Standardization and Innovation in Information Technology*, University of Colorado, Boulder, CO. US. October 3-6, 2001, p. 376.

Steven Shapiro, Barnaby Richards, Michael Rinow, and Timothy Schoechle. "Hybrid Standards Setting Solutions for Today's Convergent Telecommunications Market." *SIIT 2001 Proceedings: 2nd IEEE Conference on Standardization and Innovation in Information Technology*, Boulder, CO, US. October 3-6, 2001, pp. 348-351.

Timothy D. Schoechle. "Toward a Theory of Standards." *SIIT '99 Proceedings: 1st IEEE Conference on Standardization and Innovation in Information Technology*. Aachen, Germany. September 15-16, 1999.

Timothy D. Schoechle. *A Public Policy Debate: Standardmaking Practice and the Discourse on International Privacy Standards*. ICSR Research Paper 98-211. December 1998. p. 23.

Timothy D. Schoechle. "The Emerging Role of Standards Bodies in the Formation of Public Policy," *IEEE Standards Bearer*, Vol. 9, No. 2, April 1995. p 1, 10. Also reprinted in the Summer issue of the *ANSI Reporter* (American National Standards Institute), in the February 1996 issue of *The Australian Standard* (Standards Australia), and in the *Proceedings of the Tenth Conference on Computers, Freedom & Privacy: CFP2000*, Toronto, Canada. April 4-7, 2000, pp. 255-7.

Timothy D. Schoechle. *Internet Telephony and the Future of the Network*. unpublished manuscript, forthcoming. June, 1998. p. 26.

Timothy D. Schoechle. "Privacy on the Information Highway: Will My Home Still Be My Castle?" *Telecommunications Policy*. Vol. 19, No 6, August 1995. pp. 435-452.

Timothy D. Schoechle. "Alternative Network Architectures for the Information Superhighway and their Consumer Policy Implications." *Society and the Future of Computing Conference*, Durango, CO, US. June 13, 1995.

Timothy D. Schoechle. *Emerging Consumer Policy Issues on the Information Highway*. Masters Thesis, University of Colorado. December 1995. 55+ pages.

Timothy D. Schoechle. "Symposium Indicates Waning Japanese Confidence in HA." *The Electronic House Intelligence Report*. Vol. 8, No. 4 (April 1994). pp. 6-9.

R.F. Cruickshank and T.D. Schoechle. "Low Cost Information Gateways." Digest of Technical Papers: *International Conference on Consumer Electronics*, IEEE, Chicago, IL, US. June 6-8, 1992.

Timothy D. Schoechle and Joseph C. Kelly. "A Residential Energy Management Test Using CEBus." *IEEE Transactions on Consumer Electronics*. Vol. 38, No. 4 (November 1992), pp. 921-6.

Timothy D. Schoechle. "CEBus: An In-home Communications Network for the Future." *Proceedings of Domotique 88: First European Conference on Intelligent Homes*. La Défense, Paris, FR. January 14-15, 1988. p. 7.

Timothy D. Schoechle. "CEBus, ISDN and the Residential Gateway." Montpellier: *le bulletin de l'IDATE: Private Networks*, 9th International Conference Proceedings. No. 30, November 1987, pp. 158-70.