Committee on Energy and Commerce
U.S. House of Representatives
Witness Disclosure Requirement - "Truth in Testimony"
Required by House Rule XI, Clause 2(g)(5)

1.	**Your Name:** **Richard Bennett**		
2.	**Your Title:** Founder		
3.	**The Entity(ies) You are Representing:** High Tech Forum		
4.	**Are you testifying on behalf of the Federal, or a State or local government entity?**	Yes	No X

5. Please list any Federal grants or contracts, or contracts or payments originating with a foreign government, that you or the entity(ies) you represent have received on or after January 1, 2015. Only grants, contracts, or payments related to the subject matter of the hearing must be listed.

In August, 2015 I received a payment of SGD $36,000 from the Republic of Singapore's communications regulator, Infocomm Development Authority, for a study of Internet traffic measurement systems. The study was intended to determine whether users of ordinary Internet services had access to sufficient bandwidth run a variety of applications. It addressed a precondition for permission for ISPs to sell "paid prioritization" services to third parties.

6. Please attach your curriculum vitae to your completed disclosure form.
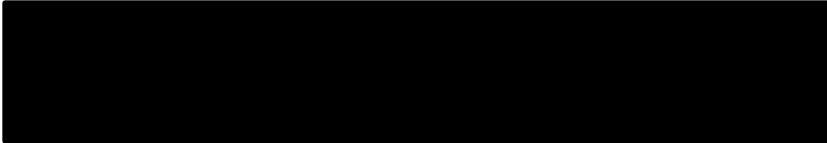
    Attached as separate document

Signature ████████████████████   Date: April 13, 2018

Richard Bennett

Curriculum Vitae

Contact Information

Summary of Skills

- Network technology developer (co-invented Wi-Fi and modern Ethernet)
- Policy analyst and consultant to thank tanks and regulatory bodies in the US and abroad
- Technology forecaster to the financial industry
- Expert consultant in intellectual property litigation
- Writer, speaker, educator and news media guest

Employment Experience

High Tech Forum, June 2010-Present, Founder

Edit and contribute to an educational initiative on networking policy and technology aimed at educating policy makers and the media on technology issues relevant to contemporary policy debates. Host podcasts with leading engineers.

Expert Witness, 2000 – Present.

Provide expert analysis, testimony, and reports to law firms engaged in intellectual property rights disputes concerning network-related technology inventions.

Network Technology and Policy Consultant, 1989 -Present

Design, extend, and teach network systems and technologies such as the Internet, Ethernet, Wi-Fi, LTE, DSL and DOCSIS. Develop policy frameworks to enhance innovation potential of network systems and advise policy makers. Testify before legislative and regulatory bodies.

Infocomm Development Authority of Singapore, 2011 – Present, Advisor.

Member of Economist and Regulatory Advisory Board. Develop recommendations on broadband Internet-related policy questions such as protocol transitions, regulatory frameworks, and ISP obligations.

American Enterprise Institute, 2013 – 2016, Visiting Fellow.

Developed policy for Internet, spectrum, and communications networks to serve the public interest, enhance social welfare, and promote innovation. Write research reports, blog posts, op-eds, and make public appearances at conferences and other gatherings as keynote speaker or panelist. Advise policy makers in FCC, Congress, and industry on mobile and broadband network technology and regulation.

Information Technology and Innovation Foundation, Washington, DC. June 2009-September 2013, Senior Research Fellow (as independent consultant.)

Advised policy makers in FCC, Congress, and industry on broadband network technology and regulation, the National Broadband Plan, and pro-innovation technology policy. Delivered speeches and engaged in panel discussions on network technology and regulation at industry gatherings and policy conferences. Wrote studies, white papers, and reports relevant to technology policy.

Actiontec Electronics, Sunnyvale, CA, 2007-2009, Principal Engineer.

Responsible for system architecture, planning, and implementation of added-value networking components of a broadband home router product line sold to Verizon and Qwest. Also developed RFP responses and helped close deals.

Trapeze Networks, Pleasanton, CA, 2005-2007, Principal Engineer.

Developed architecture and code for an advanced enterprise Wi-Fi system in a fast-paced, venture-backed startup. Also developed intellectual property around packet scheduling for QoS and collaborated with OEM customer Nortel's research team.

Sharp Labs of America, Camas, WA, 2003-2005 (as independent consultant.)

Devised the principal acceleration scheme for IEEE 802.11n, "Aggregated MPDU." Designed Distributed Reservation Protocol system for Wi-Media Alliance Ultra-Wideband network. Represented company on standards committees.

Airgo Networks, Palo Alto, 2001-2002. Technical Leader.

Developed diagnostics, chipset & access point architecture, and wireless network simulation for 802.11abgn chipset.

Cisco Systems, San Jose, 2000-2001 (as independent consultant.)

Under very tight deadlines, successfully delivered diagnostics for the two highest-priority projects for the flagship 7500 router, a gigabit Ethernet adapter and a SONET adapter.

3Com Corporation, Santa Clara, 1995-2000, 2001. (as independent consultant.)

Wrote drivers and diagnostics for 3Com Ethernet adapters from 10BaseT to 1000BaseX (Gigabit Ethernet) and helped design new hardware.

EIT, Palo Alto, CA, 1994-1995 Sr. Member Technical Staff

Developed real-time video collaboration tools under a grant from DARPA. Designed a protocol for real-time route selection and billing at Internet Exchange Points, developed a version of IP multicast for the MBONE, and wrote Java programs integrating collaboration tools.

Photonics Corporation, San Jose, 1991-94. (as independent consultant.)

In conjunction with business partner IBM, designed a preliminary version of the IEEE 802.11 MAC protocol for an infrared WLAN. Collaborated on initial design of the Wi-Fi architecture and protocols.

Fremont Communications, Fremont, 1990-1991. Vice-President of Engineering.

Managed a group of engineers responsible for all technical elements of an award-winning, low-cost PC-based fax modem, in a start-up environment.

Memorex-Telex, Milpitas, 1986-90. Director, Technical Marketing.

Co-founded the Open Token Foundation, a trade group of LAN vendors that created the testing lab now used by the Wi-Fi Alliance. Managed a group of system engineers who designed, provisioned, and installed networks for company's customers.

Excelan Inc., San Jose, 1985-1986. Lead Software Engineer.

Represented company at OSI Implementers' Workshop and contributed to design of multi-protocol framework for future development of TCP/IP and OSI protocols. Provided input on RFC 1001 and 1002 (NETBIOS over TCP/IP.)

Tandem Computers, Austin, TX, 1983-1985. Lead Software Engineer.

Served as Vice-Chair and Editor of 802.3 1Base5 Task Group, developing design of the first

Ethernet over Unshielded Twisted Pair (UTP) standard. Developed products and represented company on LAN standards committees.

Texas Instruments, Austin, TX, 1977-1983. Software Engineer/Project Lead

Designed the device I/O subsystem for a proprietary network OS. Designed and implemented the first application for company's Token Ring chipset under contract with IBM. Developed the first IBM-compatible PC and several antecedents.

Education

Post-graduate work, University of Texas, Computer Science, Logic, and EE, 1977-78.
BA, University of Texas, 1975, Philosophy.

Selected Industry Groups

- Member, Federal Communications Commission Broadband Deployment Advisory Committee Model Municipal Codes Working Group (2017 – present.)

- *You Get What You Measure: Internet Performance Measurement as a Policy Tool,* American Enterprise Institute, November 2017; http://www.aei.org/publication/you-get-what-you-measure-internet-performance-measurement-as-a-policy-tool/

- Volunteer Member, IEEE Internet Initiative (3i) Policy Track (2015 – present.)

- Member, Technical Working Group, Broadband Internet Technical Advisory Group (BITAG) (2010-present.)

- Contributor, IETF PCN, Homegate, LEDBAT and ALTO task groups (2008-2011.)

- Contributor, IEEE 802.11 & 802.11n Wi-Fi Standards, 1990-2 (Photonics), 2004-5 (Sharp Labs).

- Team Lead, WiMedia Alliance (2003-4). Contributed wireless multimedia architecture for consumer electronics over IETF, IEEE 802.15.3a, and Ultra-Wide Band (UWB).

- Contributor, IEEE 802.15.3a and MBOA MAC Protocol task group (2003-4.) Contributed critiques and enhancements to the standards body developing MAC and PHY protocols for Ultra-Wide Band communication and improvements to the vendor group.

- Secretary and Founder, Open Token Foundation (1989). Organized group of Token Ring vendors into trade group.

- Participant, OSI Workshop (1985-86). Wrote interoperability subset specification for protocol suites with multiple options, and demonstrated feasibility of open protocols

- Vice-Chair and Editor, IEEE 802.3 1Base5 task force (1984-86). Wrote first twisted-pair Ethernet Standard, the proof-of-concept for 10BaseT.

Selected Publications

You Get What You Measure: Internet Performance Measurement as a Policy Tool, American Enterprise Institute, November 2017; http://www.aei.org/publication/you-get-what-you-measure-internet-performance-measurement-as-a-policy-tool/

Arrested Development: How Policy Failure Impairs Internet Development, American Enterprise Institute, December 2015; https://www.aei.org/wp-content/uploads/2015/12/Arrested-development.pdf

"Brief for Richard Bennett in Support of Petitioners...", *US Telecom v. FCC (USCA Case #15-1063),* DC Circuit Court, August 6, 2015; http://hightechforum.org/wp-content/uploads/2015/08/bennett-filed.pdf

"Inside Obama's Net Fix", *Washington Examiner*, February 23, 2015; http://www.washingtonexaminer.com/inside-obamas-net-fix/article/2560377

"Who is winning the broadband race?", *Detroit News*, October 30, 2014; http://www.detroitnews.com/story/opinion/2014/10/30/winning-broadband-race/18138407/.

"G7 Broadband Dynamics", TPRC 42, September 12, 2014, Arlington VA; http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2418732.

"Net neutrality advocates need to get their facts straight", *US News & World Report*, May 1, 2014; http://www.usnews.com/debate-club/did-the-fccs-net-neutrality-proposal-go-too-far-or-not-far-enough/net-neutrality-advocates-need-to-get-their-facts-straight

Blueprint for a Federal Spectrum Service: A Very Rough Draft, High Tech Forum, April 24, 2014; http://www.hightechforum.org/wp-content/uploads/2014/04/Blueprint-for-a-Federal-Spectrum-Service.pdf

"Wake up, FCC: The Internet Protocol transition is now", American Enterprise Institute Economic Outlook, April 3, 2014; http://www.aei.org/outlook/economics/innovation/technology/wake-up-fcc-the-internet-protocol-transition-is-now/

"Time to Give Up the Net-Neutrality Quest", February 4, 2014, *The Wall Street Journal*, http://online.wsj.com/news/articles/SB10001424052702303519404579354801141804482

"System error: How bad analysis poisons tech policy", American Enterprise Institute Economic Outlook, January 28, 2014; http://www.aei.org/outlook/economics/innovation/technology/system-error-how-bad-analysis-poisons-tech-policy/

 "Technical Principles of Spectrum Allocation", TPRC 41, September 28, 2013, Arlington, VA.

"The Whole Picture: Where America's Broadband Networks Really Stand" (with Stewart and Atkinson), TPRC41, September 29, 2013, Arlington, VA.

"No Country for Slow Broadband", June 15, 2013, *The New York Times Sunday Review*, http://www.nytimes.com/2013/06/16/opinion/sunday/no-country-for-slow-broadband.html

"Refusing to answer to policy reasons", December 30, 2011, *The Hill's Congress Blog*, http://thehill.com/blogs/congress-blog/technology/201755-refusing-to-answer-to-policy-reasons

Spectrum Policy for Innovation, ITIF, September 2011; http://www.itif.org/files/2011-spectrum-policy-innovation.pdf

Remaking the Internet: Taking Network Architecture to the Next Level, Time Warner Cable Research Series, 2011.

"Innovation and the Internet Demand New Collaboration," *Ericsson Business Review*, June, 2010.

"Network Management and the Net Neutrality Debate," chapter in *The Net Neutrality Debate,* Universidad Politécnica de Madrid, 2011.

Going Mobile: Technology and Policy Issues in the Mobile Internet, Information Technology and Innovation Foundation, 2010; http://www.itif.org/files/100302_GoingMobile.pdf.

Designed for Change: End-to-End Arguments, Internet Innovation, and the Net Neutrality Debate, ITIF, 2009; http://www.itif.org/files/2009-designed-for-change.pdf.

Google's Political Head-fake, San Francisco Chronicle, July 9, 2008 (reprinted in Washington Times July 12). Op-Ed on Google's expansion.

WiMedia MAC Convergence Architecture, WiMedia Alliance 2004, listed co-author.

Ethernet History: Nikkei Network, February 2003 (interviewed on development of twisted-pair standard)

New Challenges in Corporate Connectivity: Dataquest, 1990 (with Glenn Schiller.)

Token Ring's First Decade: The Open Token, September-November 1989.

Supplements to IEEE CSMA/CD 802.3 Standard: IEEE, 1989, listed co-author.

Citations

Quoted dozens of times in FCC filings in the broadband management and Open Internet dockets, cited in the US Telecom challenge to the FCC's 2015 Title II reclassification of ISP services.

Issued Patents

System and method for automatic setup of a network device with secure network transmission of setup parameters, 10/27/2009. Method of easy WLAN setup. United States Patent 7,609,837.

System Clock Synchronization in an Ad Hoc and Infrastructure Wireless Networks, 2/1/2004 (with Kowalski and Kandala). Method of community clock synchronization. United States Patent 7,239,626.

Systems and methods for implementing an acknowledgment mechanism for transmission of a real-time data stream, 12/5/2003 (with Hlasny). Method of reducing packet jitter on TCP. United States Patent 7,394,813.

System and method for aggregation and queuing in a wireless network, 1/18/2011 (with Gast). Method of preserving QoS within Wi-Fi IEEE 802.11n-af A-MPDU. United States Patent 7,873,061

Other Patent Activity

Communication medium access control protocol for wireless communication, 11/15/1993 (Credited to Chen et. al.) US PTO 5,502,724. Allocates network time for Wi-Fi. (note: Photonics employees Tom Kurata and Stan Fickes developed this patent with my collaboration.)

State Description and Retry Strategy for Aggregated 802.11n Frames, 8/11/2004 (with Kowalski and Kandala). Prepared for USPTO filing. This is the method used for A-MPDU in 802.11n.

Selected Conferences and Public Appearances

The Research Conference on Communication, Information and Internet Policy (TPRC,) Arlington, VA, 2009 - 2017, presented multiple papers and took part in numerous panel discussions.

Life, Liberty and the Pursuit of Privacy, Cal Innovates, Russell Senate Office Building, Washington DC, September 2016.

IEEE Experts on Technology and Policy forum, GWU, Washington DC, February 2016.

IEEE Symposium on Internet of Things, Rayburn Building, Washington DC, September 2015.

Wells Fargo 2014 Small Cell Symposium, New York, July 2014, Presenter.

US Telecom Leadership Committee Retreat, Vail Colorado, June 2014. Keynote speaker.

Third Way Symposium on Video on the Internet, Washington, DC, June 2014. Presentation.

Spectrum Beyond Incentive Auctions, Washington, DC, April 2014.
http://iep.gmu.edu/conference-spectrum-beyond-incentive-auctions/. Presentation.

Tech policy 2014: The Year Ahead, Washington, DC, January 2014.
(http://www.aei.org/events/2014/01/17/tech-policy-2014-the-year-ahead/)

XXI International Conference on Intellectual Property, Yalta, Ukraine, September 2013
(http://iiiconference.org.ua), keynote speaker.

U. S. Department of State, U. S. Speakers Program. Kyiv, Ukraine, September, 2013. Speeches
and lectures on intellectual property rights.

U. S. House of Representatives Subcommittee on Technology and Innovation, hearing on
"Avoiding the Spectrum Crunch," April 18, 2012, witness.

M3AAWG, San Francisco, CA, February 2012, Internet piracy speaker.

Caribbean Telecommunications Union Ministerial Summit, Barbados, December 2011, keynote.

Congressional Internet Caucus Advisory Committee "State of the Mobile Net" and "State of the
Net" Conferences, 2009-2012.

Australian Telecom User's Group Annual Meeting, April 2011, keynote speaker.

IDA Roundtable on Internet Policy, Singapore, March 2011, invited participant.

FutureNet Expo, Boston, 2010. Keynote and "Fixing the Internet" panelist.

Brussels, Telia Sonera Openness Event, 2010, speaker.

eComm 2009, 2010, San Francisco, CA, speaker and panelist.

KIT, Karlsruhe, European Commission Open Networks Roundtable, 2010, invited participant.

U. S. House of Representatives Subcommittee on Communications, Technology, and the
Internet. First US Congress hearing on Internet privacy, April 23, 2009, witness.

MAAWG, San Francisco, CA, February 19, 2009, Net Neutrality panelist.

Institute for Policy Innovation events on European network regulation, Brussels and London,
October 14-15, 2008. Internet Regulation panelist.

Innovation '08, MAP Network Management event, Santa Clara, CA, June 25, 2008, panelist.

Supernova 2008, San Francisco, CA, June 18, 2008. Broadband future panel.

Federal Communications Commission public en banc hearing on broadband network
management practices, Cambridge, MA, February 25, 2008. Technical experts panel.

Professional Memberships

IEEE, IEEE Standards Association, ACM, ISOC.