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## Roger B. Marks, Ph.D., IEEE Fellow

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### Profile

Technology developer and innovation leader in data networking, wireless communications, and technical standardization

### Skills and Expertise

data networks; telecommunications; wireless communications; mobile broadband; 5G; 4G; ITU-R, IMT-2020; IMT-Advanced; IMT-2000; IEEE 802; IEEE 802.16; IEEE 802.11; IEEE 802.1; WiMAX; Wi-Fi; LTE Licensed-Assisted Access (LAA); Carrier Ethernet; Software-Defined Networking (SDN); global and local addressing; OpenFlow; technical group leadership; technical writing and editing; public speaking; international standardization; FRAND; patents; standards-essential patents (SEP); litigation consultant; expert witness

### Education

- Yale University, **Ph.D., M.Phil., M.S.** (Engineering and Applied Science/ Applied Physics)
- University of Utah, **M.E.** (Electrical Engineering)
- Princeton University, **A.B.**(Physics)

### Employment

#### **CONSENSII LLC & ETHAIRNET ASSOCIATES, DENVER, CO: FOUNDER AND PRESIDENT (2011 – )**

Technology development and client representation in 4G/5G wireless data communications and Ethernet. Developed and proposed technology for standards on 5G, local addressing, OmniRAN Open Mobile Network Interface, wireless small cell backhaul, Carrier Ethernet, software-defined networks (SDN), LTE Licensed-Assisted Access (LAA), network performance measurement. Activities in IEEE 802, ITU, Metro Ethernet Forum, Open Networking Forum. Consulting in standardization, technology development, and patents.

Technical consulting clients, 2016-17: IEEE (5G Standardization); Huawei (Wireless LAN research)

#### **WIMAX FORUM: VICE PRESIDENT FOR TECHNOLOGY AND STANDARDS (2009 – 2011)**

- Mobile WiMAX standardization and certification in non-profit organization with hundreds of member companies
- Developed and managed Technology Department, including standardization, certification program, and publications
- Designed, organized, and chaired Technical Steering Committee in frequent teleconferences and face-to-face meetings
- Led IEEE participation in ITU-R Working Party 5D

#### **NEXTWAVE WIRELESS INC., SAN DIEGO, CA: SENIOR VICE PRESIDENT (2006 – 2009)**

- Technology development and standardization related to mobile broadband, IEEE 802.16, ITU, IMT-2000, and IMT-Advanced
- Standardization and internationalization in IEEE 802 and ITU, including IMT-2000 and IMT-Advanced
- Technology and intellectual property development; Technical Development Steering Committee member

#### **NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST), BOULDER, CO: PHYSICIST (1989 – 2006)**

- Electronics and Electrical Engineering Laboratory, NIST, United States Department of Commerce
- Standardization of wireless data networks; research and development in radio electronics for wireless communications.

#### **DELFT UNIVERSITY OF TECHNOLOGY, DELFT, NETHERLANDS: POSTDOCTORAL ASSOCIATE (1988 – 1989)**

- Department of Electrical Engineering, Laboratory of Electromagnetic Research
- Conducted and published research

#### **YALE UNIVERSITY, NEW HAVEN, CT: RESEARCH AND TEACHING FELLOW (1982 – 1987)**

- Department of Engineering and Applied Science
- Conducted and published theoretical and computational research on electromagnetism.

#### **LAWRENCE BERKELEY NATIONAL LABORATORY, BERKELEY, CA: RESEARCH ASSISTANT (SUMMER 1985)**

- Conducted and published research on high-power electromagnetic sources, for Accelerator and Fusion Research Division

#### **RAYTHEON CORP., WALTHAM, MA: MICROWAVE TUBE ENGINEER (1981)**

### **Publications and Presentations** <<http://consensii.com/marks/pub.html>>

- Co-author: *WirelessMAN: Inside the IEEE 802.16 Standard for Wireless Metropolitan Area Networks* (IEEE Press, 400 pages)
- Approximately 120 other technical publications (standards; journal articles; conference papers; technical reports, etc.)
- Dozens of conference presentations, lectures, and keynote addresses <<http://consensii.com/marks/talks.html>>
- Hundreds of documents written and presented to standardization bodies, mainly in IEEE 802

### **Patents**

US 7990944, US 8139537, US 8861437, US 8687585, CN 101911534, US 9474072, WO2014165278

Two US patent applications in process as sole inventor

Supervision of patent policies and procedures within IEEE 802.16 Working Group (1999-)

### **Professional Certification**

- Metro Ethernet Forum, MEF Carrier Ethernet Certified Professional 2.0 (MEF-CECP 2.0), 2014
- Metro Ethernet Forum, MEF Carrier Ethernet Certified Professional (MEF-CECP), 2013
- FCC Amateur Radio Operator License, General Class (W1NOT)

### **Awards - Government**

- US Department of Commerce *Gold Medal* (2003) for "for strategic vision and leadership in initiating and driving the development of international standards for broadband wireless access technology"
- US Department of Commerce *Silver Medal* (2004) for "effective response to China's proposed wireless encryption standard"
- US Department of Commerce *Silver Medal* (1999) "for creating N-WEST, an entrepreneurial vehicle for industry to develop standards needed to jumpstart a fast-moving wireless communication service"
- US Department of Commerce *Silver Medal* (1995) for "development of methods and basic theory enabling industry to make on-wafer measurements at required accuracies of wireless and other MMIC chips"
- US Department of Commerce *Bronze Medal* (1992) for "developing methods for determining key parameters to support characterization of monolithic microwave integrated circuits and interconnects"
- *Documentary Standards Award*, NIST Electronics and Electrical Engineering Laboratory (2006)
- *Outstanding Paper Award*, NIST Electronics and Electrical Engineering Laboratory (1992)

### **Awards - Private Sector**

- *IEEE Standards Association International Award* (2006)
- *Individual Governmental Vision Award*, Wireless Communications Association (2003)
- *Meritorious Service Award*, IEEE Microwave Theory and Techniques Society (2002), for "organizing the first Wireless Communications Conference in 1996, which evolved into the Radio and Wireless Conference, and serving as General Chair for the years 1996-1999"
- *IEEE Fellow* (2000) for "standards and measurement techniques for wireless communication systems and components"
- *IEEE Morris E. Leeds Award (IEEE Technical Field Award)* for Outstanding Contributions in Electrical Measurement (1995)
- *Automated Measurements Technology Award*, Automatic Radio Frequency Techniques Group (1994)
- *Harding Bliss Prize*, Yale University (1988)
- Connecticut High Technology Graduate Scholarship (1984-1987)
- Various best paper awards, young scientist awards, service awards, etc.

### **Professional Leadership**

#### **TECHNICAL EDITOR, IEEE PROJECT 802c (2015-)**

- IEEE 802 Overview and Architecture – Local Medium Access Control (MAC) Address Usage

#### **TECHNICAL EDITOR, IEEE PROJECT 802.1CQ (2016 -)**

- Multicast and Local Address Assignment

#### **MEMBER, REGISTRATION AUTHORITY COMMITTEE, IEEE STANDARDS ASSOCIATION (2017-19)**

#### **VICE CHAIR, ADVANCED ACCESS NETWORK INTERFACE (AANI) STANDING COMMITTEE, IEEE 802.11 WG (2017-)**

#### **PARTICIPANT, IEEE 802 5G/IMT-2020 STANDING COMMITTEE (2016)**

#### **CHAIR, IEEE 802.16 WORKING GROUP ON BROADBAND WIRELESS ACCESS (1998 -)**

- Initiated Working Group. Elected as Chair ten times. Led development of IEEE Standard 802.16, the first 4G wireless standard and the basis of WiMAX technology. Led successful effort toward international ITU recognition of IEEE 802.16 as IMT-2000 and IMT-Advanced, with tens of millions of devices deployed and tens of billions of dollars of economic value. Initiated new projects and provided technical contributions. Completed 23 standards publications.
- Organized and chaired approximately 100 sessions of IEEE 802.16 Working Group, in Canada, China, Egypt, Finland, India, Israel, Italy, Japan, Korea, Russia, Singapore, Spain, Switzerland, Taiwan, and USA, with attendance peaking at 462 people.

#### **MEMBER, EXECUTIVE COMMITTEE, IEEE 802 LAN/MAN STANDARDS COMMITTEE (1998 -)**

- Oversight and leadership of the world's premier developer of standards for local and metropolitan area computer networks.
- Active participation at six face-to-face meetings a year for 18 years, plus teleconferences.

### **OTHER PROFESSIONAL LEADERSHIP ROLES**

- Member, Advisory Board, Interdisciplinary Telecommunications Program, University of Colorado at Boulder (2003-2015)
- Invited US representative to conference on "ICT Standards and Patents," Brussels, Belgium, co-organized by European Commission and European Patent Office (2011)
- Technical Program Committee, Technical Symposium, ITU Telecom World (2011)
- Speaker, ITU Telecom World (Geneva 2003, Hong Kong 2006, Dubai 2012)
- Speaker, Distinguished Visitors Program, IEEE Computer Society (2002-2005)
- Member, Administrative Committee, IEEE Microwave Theory and Techniques Society (1999-2001)
- Distinguished Microwave Lecturer, IEEE Microwave Theory and Techniques Society (1999-2001)
- Standards Coordinating Chair, IEEE Microwave Theory and Techniques Society (1996-2002)
- Founder and Chair, IEEE Radio and Wireless Conference (1998-1999) and Wireless Communications Conference (1996-1997)
- Associate Editor, *China Communications Magazine*, 2005-2006
- Member, Executive Committee, Automatic RF Techniques Group (ARFTG), 1995-1998
- Associate Guest Editor, Special Issue of the *IEEE Transactions on Microwave Theory and Techniques*, December 1997
- Frontiers of Engineering Program, National Academy of Engineering, 1996 (for "100 of the nation's outstanding young engineers (ages 30-45)... by invitation following a competitive nomination and selection process")

### **SYMPOSIA ORGANIZATION**

- Program Committee, International Symposium on Advanced Radio Technologies, 2004
- Program Committee, IEEE Conference on Standardization and Innovation in Information Technology, 2003, 2005, 2007
- Organizing Committee, IEEE Conference on Standardization and Innovation in Information Technology, 2001
- Founder/Chair, IEEE Radio and Wireless Conference (RAWCON), 1998-1999
- Founder/Chair of the 1996 and 1997 Wireless Communications Conference (WCC)
- Chair, 49th ARFTG Conference, on "Characterization of Broadband Telecommunications Components and Systems"
- Vice Chair, 1997 IEEE MTT-S International Microwave Symposium (IMS'97); Organizer and Chair of the Plenary Session