



Federal Communications Commission

Workshop
on
GPS Protection and Receiver Performance

Agenda
and
Biographies

June 20, 2014



Workshop Agenda

9:00 am-
9:15 am Welcome and Opening Remarks FCC Chairman Tom Wheeler
FCC Chairman Tom Wheeler

9:15 am-
9:30 am Introductory Remarks
Admiral David Simpson, Chief, FCC Public Safety and Homeland Security Bureau

9:30 am-
10:00 am Tutorial: Growth of wireless and GPS industries
Steve Koenig, Director of Industry Analysis, Consumer Electronics Association

10:00 am-
10:15 am Break

10:15 am-
11:45 am Panel 1: Importance of GPS for Critical Infrastructure and Public Safety Users

Panelists:

Rob Crane, Homeland Security Advisor, National Coordination Office for the U.S. Space-Based Positioning, Navigation, and Timing

Jim Higgins, Deputy Regional Director, Northeast Region, FCC Enforcement Bureau

David Turner, Vice Director, Office of Space and Advanced Technology, Department of State

Greg Buchwald, Distinguished Member of the Technical Staff (DMTS) Engineer, Motorola, Inc.

Cormac Conroy, Vice President, Engineering and Product Management, Qualcomm

Terry Hall, Second Vice Chair, National Public Safety Telecommunications Council

Joseph Marx, Assistant Vice President, Federal Regulatory, AT&T

Moderators:

Karl Kensinger, FCC International Bureau

Eric Panketh, FCC Public Safety and Homeland Security Bureau

11:45 am-
12:00 pm Keynote:
Major General Robert Wheeler, Deputy Chief Information Officer, Department of Defense

12:00 pm-
1:00 pm Lunch Break

1:00 pm-
2:15 pm Panel 2: Protecting RNSS Spectrum and GNSS Operations

Panelists:

Chris Helzer, Chief Engineer, FCC Wireless Telecommunications Bureau

Jim Arnold, Senior Engineer, Department of Transportation Spectrum Management

James Champion, Principal Action Officer, Office of Department of Defense Chief Information Officer

Cormac Conroy, Vice President, Engineering and Product Management, Qualcomm

Andy McGregor, Systems Engineer, Ericsson

Nelson Ueng, Principal Engineer, T-Mobile

Geoff Stearn, Vice President, Spectrum Development, LightSquared

Moderators:

Ed Drocella, Chief, Spectrum Engineering and Analysis Division, National Telecommunications and Information Administration (NTIA) Office of Spectrum Management

Michael Ha, Deputy Chief, Policy and Rules Division, FCC Office of Engineering and Technology

2:15 pm-
3:30 pm

Panel 3: GPS/GNSS Receiver Performance

Panelists:

Ron Borsato, Principal Architect, Spirent Communications PLC

Chris Hegarty, Director, Communications, Navigation, and Surveillance Engineering and Spectrum, MITRE Corp.

Scott Burgett, Director, GNSS and Software and Technology, Garmin International

Sandy Kennedy, Director, GNSS Receiver Engineering, NovAtel Inc.

Paul Galyean, Consultant, Deere and Company

Marc Weiss, Ph.D., Time and Frequency Division, National Institute of Standards and Technology, Chairman, Workshop on Synchronization in Telecommunication Systems

Moderators:

Bob Pavlak, Electromagnetic Compatibility Division, FCC Office of Engineering and Technology

Ron Repasi, Deputy Chief, FCC Office of Engineering and Technology

3:30 pm-
3:45 pm

Break

3:45 pm-
4:00 pm

Remarks

Tom Power, Deputy Chief Technology Officer, Telecommunications, Office of the Chief Technology Officer, Office of Science and Technology Policy, Executive Office of the President of the United States

4:00 pm-
4:50 pm

Panel 4: GPS Certification and Transition Plans

Panelists:

Milton Clary, Aerospace Policy Analyst, Overlook Systems, Inc.

Scott Bergmann, Vice President, Regulatory Affairs, CTIA The Wireless Association

Ron Borsato, Principal Architect, Spirent Communications PLC

Karen VanDyke, Director, Positioning, Navigation, and Timing, U.S. Department of Transportation

Jim Kirkland, President, GPS Innovation Alliance, General Counsel, Trimble Navigation

Ray Swider, Program Analyst, Office of Department of Defense Chief Information Officer

Moderators:

Julius Knapp, Chief, FCC Office of Engineering and Technology

Karl Nebbia, Associate Administrator, NTIA Office of Spectrum Management

4:50 pm-
5:00 pm

Wrap Up

Julius Knapp, Chief, FCC Office of Engineering and Technology

Biographies

Tutorial

Steve Koenig is Director of Industry Analysis at Consumer Electronics Association (CEA). As a part of CEA's market research team, Koenig oversees CEA's statistical program, CE MarketMetrics, and leads the association's semi-annual CE Industry Forecasts. With nearly 20 years of experience, Steve is frequent conference speaker and contributing editor to many industry publications. Prior to CEA, Steve held industry analyst positions at Comscore, NPD Group and a senior editor post at CMP Media's former Computer Retail Week. Koenig holds a bachelor's degree in marketing from University of North Texas.

Panel 1: Importance of GPS for Critical Infrastructure and Public Safety Users

Robert Crane is the homeland security advisor at the National Coordination Office for the U.S. Policy on Space-Based Positioning, Navigation and Timing. Since joining the Department of Homeland Security in 2005, Mr. Crane is responsible for aligning national policy on space, the Global Positioning System and its augmentations with the geospatial-intelligence, information sharing, infrastructure protection, cybersecurity and resilience strategies of the Department. In coordination with the Federal Communications Commission, Mr. Crane continues elevating awareness of the illegal nature of radio frequency jammers and the threat posed to first responders, public safety, other critical infrastructures and industrial control systems from harmful interference. Previous assignments include serving as the deputy director of the joint National Security Systems program at DHS, advisor to the U. S. Coast Guard and DHS on the maritime information sharing environment, and Reserve Commander in the Coast Guard, holding a number of full-time positions in maritime homeland defense, contingency planning and operations, and workforce management prior to his retirement in 2004. He has private sector experience in oil & gas, banking & finance, and agriculture sectors.

Mr. Crane holds a B.S., a M.B.A., and business continuity credentials, along with membership in a number of professional military and homeland security-related organizations. Outside his Federal employment, Mr. Crane serves as an adjunct professor of business continuity and infrastructure studies for the University of Central Missouri.

Jim Higgins has been employed by the FCC for 36 years as an Electronics Engineer. He joined the Commission in 1978, starting at the FCC's Field Engineering Training Center, and then working on diverse field interference, inspections and investigations involving CB, amateur and land mobile radio issues. Jim was the Engineer-in-Charge of one of the FCC's Broadcast/CATV and Microwave Measurement Units starting in the early 1980's, responsible for measurements, interference investigations, inspections and enforcement in those services. In the mid to late 1990's, he became involved in special project development, including communications circuit planning for the new High-Frequency direction-finding system control center at Columbia, the prototyping of a new mobile DF system integrating GPS, mapping and radio control, and digital television testing. Prior to his present position as Deputy Regional Director for FCC Northeast Region field offices, Jim was responsible for the FCC's satellite monitoring facility at Columbia and also served as the District Director of the Columbia (MD) Field Office, as well as working on various special projects in the northeast region and nationally. Jim also serves as the U.S. Head of Delegation to ITU-R Working Party 1C – Spectrum Monitoring.

Jim is a 1976 graduate of the University of Massachusetts- Lowell (formerly Lowell Technological Institute) with a BS degree in Electrical Engineering. Prior to joining the FCC, he worked for a Major Cable MSO in cable systems in Massachusetts and New Hampshire.

David A. Turner is the Deputy Director of the Office of Space and Advanced Technology (SAT), within the U.S. State Department's Bureau of Oceans, Environment, and Science. Together with the Office Director, he manages SAT's broad portfolio of civil and dual-use space cooperation issues and diplomatic efforts focused on multilateral science and advanced technology activities, including the development and implementation of the civil aspects of National Space Policy.

Previously, Mr. Turner was an employee of the Aerospace Corporation, serving as Director of the Corporation's Center for Space Policy and Strategy, which conducts space policy and strategy analyses for government customers. He was also a senior project engineering within the Corporation, focusing on GPS policy and technology matters such as compatibility and interoperability with other satellite navigation systems, and GPS modernization. Mr. Turner also served in the U.S. Department of Commerce as the Director of the Interagency GPS Executive Board (IGEB) Secretariat, providing technical and managerial support to the IGEB, its Senior Steering Group, and the working groups formed under its auspices. While in this position, he was a key member of the U.S. Delegation that negotiated the 2004 Executive Agreement between the U.S. and Europe Union on Cooperation Between the GPS and Galileo satellite navigation programs.

Prior to his employment with the Aerospace Corporation and the Federal Government, Mr. Turner was a staff officer of the Aeronautics and Space Engineering Board of the National Academies, and a consultant to the Science Policy Research Division of the Congressional Research Service.

Gregory Buchwald is a Distinguished Member of the Technical Staff (DMTS Engineer) for Motorola Solutions, Inc. Greg joined Motorola, Inc. (now Motorola Solutions, Inc.) in 1980. He has been involved in wide-ranging activities including commercial broadcast, public safety and commercial narrowband and broadband communications systems research, and advanced development projects. Assignments have included spectrum engineering and efficient spectrum use projects, external standards activities including chairing 802.22.1, and various international standards activities. Recently, Greg led the project to analyze the effects of L-band terrestrial signal deployment, including LTE, adjacent to the GPS allocation. This led to directed revisions and improvements in MSI product offerings anticipating the effects upon GPS of eventual use of L-band spectrum for new services. He was an advisor / participant in the FCC-mandated Precision Timing and Location / Navigation Working Sub-groups that performed analysis of the effects of high power, terrestrial LTE upon adjacent GPS services in 2011. He also Chaired the Precision Timing and General Location / Navigation subgroups for the National Public Safety Telecommunications Council (NPSTC). Greg currently has 18 issued US Patents, is a MSI Science Advisory Board Associate and a member / participant of the MSI Spectrum Engineering Center of Excellence.

Cormac Conroy received the PhD in Electrical Engineering in 1994 from UC Berkeley, and worked at multiple companies in Silicon Valley. In 2001, he co-founded Berkana Wireless – a company developing highly integrated RF CMOS transceivers for cell phones. Berkana was acquired by Qualcomm in 2006 and its technology was widely deployed across Qualcomm mobile phone platforms.

Cormac is currently Vice President at Qualcomm, and leads the technology and product development, as well as associated product management and business development, for all of Qualcomm's GPS/GNSS and end-to-end location technology and products, as well as wireless connectivity products for mobile and computing platforms. He is based in Santa Clara, California.

Terry Hall is the Immediate Past President of the Association of Public-Safety Communications Officials (APCO) International. With over thirty years of experience in public safety, Terry is currently the Communications Manager for the York County, Virginia Regional Emergency Communication Center. Through Terry's leadership and vision, the region designed, built and implemented this state-of-the-art facility, which serves the County of York, the City of Poquoson and the City of Williamsburg in Virginia. York County was the first 9-1-1 Center to deploy Phase I & Phase II Enhanced 9-1-1 service in Virginia and also to develop wireless public safety communications technology currently in use throughout the country. Terry was appointed by the Virginia Governor to the State E9-1-1 Services Board. He is also currently the Project Manager for the Regional Radio System that encompasses six localities in Virginia. As a past member of the Virginia 2 Urban Search & Rescue and the Virginia 1 Disaster Medical Assistance Teams, Terry spent over two months deployed on search, rescue and restoration efforts for Hurricanes Katrina, Rita, Isabelle and Gustav. Among multiple other recognitions, in 2006 Terry received the Virginia Governor's Award for Excellence and the APCO International Communications Director of the Year Award. Terry is often called upon nationwide as a subject matter expert pertaining to issues concerning emergency communications and public safety.

Joseph Marx is the Assistant Vice President - Public Safety and Homeland Security for AT&T and is responsible for Federal policy and strategic planning on public safety, homeland security, cyber security and emergency preparedness. Prior to joining the Federal Regulatory Group, Joe led the engineering team at AT&T Wireless responsible for the deployment of E911 and Location Technology. As a leader in the field of public safety and emergency preparedness, Joe plays a key role in crafting AT&T public safety policy.

Joe has more than 30 years experience in the wireless and wired telecommunications industry and has held leadership positions in the Technology, Product Management, and Operations. He brings to the Federal regulatory environment an understanding of how public policy influences business decisions. Joe currently serves as a board member for the Next Generation 911 Institute and Industry Council for Emergency Response Technologies (iCERT). Joe has worked for AT&T throughout his 30 year career and originally started in the prestigious Bell Laboratories. He received a Bachelors of Science in Software Engineering from Illinois Benedictine College and a Masters of Science in Software Engineering from the Illinois Institute of Technology.

Keynote

Major General Robert E. Wheeler is currently serving on the staff of the Secretary of Defense as the Deputy Chief Information Officer for Command, Control, Communications and Computers (C4) and Information Infrastructure Capabilities (DCIO for C4IIC).

General Wheeler was commissioned through the Reserve Officer Training Corps. A command pilot with more than 5,000 hours in multiple aircrafts. His staff assignments include air campaign analyst for the Air Force Studies and Analysis Agency, member of the Chief of Staff of the Air Force's Operations Group (CX), Headquarters U.S. Air Force and division chief for the Joint Chiefs of Staff regarding European security issues. He has also been the senior military adviser to the U.S. Mission for the Organization for Security and Cooperation in Europe.

The general was previously the Deputy Director for Nuclear Operations, U.S. Strategic Command, Offutt Air Force Base, Neb. In this capacity, he is the principal adviser to the commander on issues pertaining to strategic deterrence and nuclear operations. He served as the command's principal flag officer responsible for management and oversight of the nuclear enterprise. He has previously commanded the 325th Bomb Squadron and 509th Operations Group at Whiteman AFB, Mo. He commanded the 2nd Bomb Wing at Barksdale AFB, La., where he was responsible for providing B-52 aircraft, aircrews and associated support personnel and resources to conduct global bomber operational taskings. He also commanded the 509th Bomb Wing, Whiteman AFB, Mo., where he was responsible for the combat readiness of the Air Force's only B-2 wing and provided logistics support for the Air Force Reserve 442nd Fighter Wing Missouri Air National Guard 131st Bomb Wing; Missouri Army National Guard 1st Battalion, 135th Aviation Unit; and the Navy Reserve Maritime Expeditionary Security Division 13.

Panel 2: Protecting RNSS Spectrum and GNSS Operations

Chris Helzer is the Chief Engineer of the Wireless Telecommunications Bureau. Prior to joining the Commission in 2011, Chris worked 19 years in the cellular industry, including 5 years as Partner at Wireless Strategy, LLC, a consulting company focusing on executive engineering services, 6 years as Director of Radio Architecture at Nextel Communications, and 7 years as an RF engineering consultant at LCC International.

Jim Arnold is currently Senior Engineer with the Office of Position, Navigation, and Timing and Spectrum within the Office of the Assistant Secretary for Research and Development. He focuses on management of DOT's use of spectrum and supporting individual agencies in their efforts to improve the safety, efficiency, and reduce environmental impact of transportation through the use of communications services and technologies. Formerly with the Federal Highway Administration Office of Operations, Research and Development, he brings a broad range of application knowledge and technology use for improving road safety through telecommunication, vehicle positioning, and mapping.

Mr. Jim Campion serves at Office of the Secretary of Defense (OSD), Office of the Chief Information Officer (DoD CIO), Spectrum Policy and Programs Directorate as principal staff officer for spectrum matters pertaining to terrestrial communications, since 2009. As such, he oversees and develops DoD policies and strategic plans for radiofrequency spectrum dependent systems and operations in command, control and communications; guided weapons; positioning navigation and timing; radars; telemetry; and electronic warfare.

A career telecom professional, Jim previously accrued twenty years of engineering and management experience at major commercial communications providers: national and international telecom carriers, satellite systems integrators, and IT / telecom software / hardware builders. Interposed in that, he also served three years prior federal service at the then DHS Office of National Public Preparedness as senior communications technology member of the Secretary's Emergency Response Team; for plans and responses to natural disasters, pandemic diseases, and nuclear / biological / chemical attacks. Jim began his career as a US Navy engineering officer, with 6 years active duty on several combatant ships and overseas deployments. His education comprises a bachelor degree in electrical engineering, post-graduate credentials in telecommunications and information systems design, a master degree in business administration, plus several corporate and federal executive education programs.

Cormac Conroy received the PhD in Electrical Engineering in 1994 from UC Berkeley, and worked at multiple companies in Silicon Valley. In 2001, he co-founded Berkana Wireless – a company developing highly integrated RF CMOS transceivers for cell phones. Berkana was acquired by Qualcomm in 2006 and its technology was widely deployed across Qualcomm mobile phone platforms. Cormac is currently Vice President at Qualcomm, and leads the technology and product development, as well as associated product management and business development, for all of Qualcomm's GPS/GNSS and end-to-end location technology and products, as well as wireless connectivity products for mobile and computing platforms. He is based in Santa Clara, California.

Andy McGregor has been in Ericsson LTE Systems for 5 years. For the 20 years prior to that, he worked in Nortel's Systems team supporting various mobile wireless technologies including LTE, 1xRTT and GSM. Andy provided some LTE background information to CSMAC WG5 that explored the possible 1755-1780 MHz AWS-3 options. Andy is the chairperson of the RABC Advanced Wireless sub-committee, an industry group which advises the Canadian Spectrum Regulator on technical wireless issues.

Nelson Ueng has 20+ years of working experience in wireless communications. Mr. Ueng is currently with T-Mobile USA. Before T-Mobile, Mr. Ueng was with Lucent Technologies in Taiwan.

At T-Mobile, Mr. Ueng works in relation to the following areas:

- Business, Technology and Spectrum Strategy Development
- Cross functional engineering Design in development of Technology and Strategy
- Communication of Strategy with Executives at T-Mobile
- Representing T-Mobile Publically in
 - Industry Fora such as CTIA and 4G Americas
 - 3GPP Standards meetings
 - Regulatory/Policy proceedings such as the FCC's, etc.

Nelson Ueng studied at University of Colorado at Boulder from 1992 to 1996, where he earned his Ph.D. & M.S. degrees in Electrical and Computer Engineering. Before that, Mr. Ueng studied at National Tsing-Hua University in Taiwan, where he obtained M.S. & B.S. degrees in Nuclear Engineering in 1984 and 1982, respectively.

Geoffrey Stearn is LightSquared's Vice President of Spectrum Development. He has held a variety of management and executive positions; leading work on some of the most complex spectrum issues that have arisen during the past 25 years. At LightSquared, he is responsible for managing the company's spectrum portfolio and led the company's participation in the GPS technical working group. Previously he was an executive with Nextel Communications where he was responsible for the company's spectrum acquisition and development initiatives and where he played a senior role in the development and early implementation of the 800 MHz band reconfiguration program. Prior to Nextel, Geoff held various management positions with McCaw Cellular Communications in regulatory, technical operations and business operations functions.

Panel 3: GPS / GNSS Receiver Performance

Ronald Borsato is a Principle Architect at Spirent Communications in Eatontown, NJ and is the Vice Chair of the CTIA's OTA Working Group. For the past eighteen years, he has worked at recognized companies at various levels of the supply chain in the wireless industry. He served as a technical advisor to the cellular sub-team of the LightSquared TWG. As a recognized industry leader in the development of radiated sensitivity testing, he has contributed to the CTIA Test Plan for Wireless Device Over the Air Performance as part of the CTIA OTA Working Group and chaired the CTIA GPS Subgroup during the development of the GPS OTA test methodology. He actively participates in 3GPP on LTE and OTA matters. He received his Masters of Science in Electrical Engineering at the University of Texas at Arlington specializing in wireless communications and received his Bachelor of Science in Electrical Engineering at Virginia Polytechnic Institute and State University."

Christopher J. Hegarty is the Director for CNS Engineering & Spectrum with The MITRE Corporation, where he has worked mainly on aviation applications of GNSS since 1992. He received B.S. and M.S. degrees in electrical engineering from WPI and a D.Sc. degree in EE from GWU. He is currently the Chair of the Program Management Committee of RTCA, Inc., and co-chairs RTCA Special Committee 159 (GNSS). He is a Fellow of the ION and IEEE, and co-editor/co-author of the textbook Understanding GPS: Principles and Applications, 2nd Ed.

Scott Burgett is the Director, GNSS and Software and Technology at Garmin International. Scott has been involved with the GPS System since 1991. He has worked for Garmin for over 15 years. He has been the Director of GNSS (Global Navigation Satellite Systems) since January of 2012. Throughout his career at Garmin, Mr. Burgett has worked on the integration of GPS technology into Garmin's consumer and aviation products. These include PNDs (portable navigation devices), handheld devices, fitness devices, and others. Mr. Burgett has management responsibility for the evaluation, selection, integration, and proper functioning of GPS technology in Garmin consumer devices. He has extensive knowledge of the GPS system and its operation. He works with many companies in the GPS industry and is well known throughout the industry. Scott is a member of the Institute of Navigation and a frequent speaker and participant at conferences on GPS regulation. Mr. Burgett holds a Bachelors of Science in Electrical Engineering from Kansas State University, and a Master's of Science in Electrical Engineering from the University of New Mexico.

Sandy Kennedy is the Director and Chief Engineer of GNSS receiver cards at NovAtel Inc. She received her B.Sc. and M.Sc. degrees in geomatics engineering at the University of Calgary. She joined the research group at NovAtel in 2004, working on precise carrier phase based positioning methods, and then spent several years working with deeply coupled GNSS/INS integration before transitioning to focus on receiver card design in 2013.

Paul Galyean currently serves as a Consultant to Deere and Company and previously was Director of Advanced Engineering at NavCom Technology (now part of Deere's Intelligent Solutions Group), a subsidiary of Deere, before his retirement in 2012. Prior to his service at NavCom and Deere, he worked at Leica and Magnavox in integrated navigation systems. His satellite navigation experience reaches back into the Transit (NNSS) era and he has developed systems and receivers for aircraft, marine, and land PNT applications. At NavCom, he managed the development of a certified aviation receiver and the development of the technology used in current Deere and NavCom products. He has managed the StarFire network, which provides Deere users with sub-decimeter-level navigation. He was the lead for the High Precision team in the FCC-mandated testing of LightSquared interference with GPS. He holds a PhD in Mathematics from UCLA.

Marc Weiss, Ph.D., worked at NIST (the National Institute of Standards and Technology--formerly NBS, the National Bureau of Standards) from 1979, specializing in time transfer techniques. As of January 2014 he is now a contractor for NIST. He received the NBS Applied Research Award for a first GPS timing receiver in 1983. He was awarded a patent for the Smart Clock algorithm in 1993, which optimally locks a slave clock to a master. Dr. Weiss won the 2013 NIST William P. Slichter Award, "For pioneering highly productive industry/ government partnerships to advance telecommunications and data networks through precision synchronization." Marc founded and has led WSTS, the Workshop on Sync in Telecom Systems, annually since 1992. Dr. Weiss has also led the NIST program to support the GPS program office in developing their clocks and timing systems since 1980. He has worked on problems with Relativity as they relate to GPS and to primary frequency standards. He received his Ph.D. in Mathematical-Physics from the University of Colorado in 1981.

Remarks

Thomas C. Power has served as the U.S. Deputy Chief Technology Officer for Telecommunications at the White House Office of Science and Technology Policy since August 2011. As Deputy CTO, Tom helps develop and coordinate Administration policy on telecom and technology issues. Before joining OSTP, Tom served for more than two years as the Chief of Staff of the National Telecommunications and Information Administration at the U.S. Department of Commerce. At NTIA, Tom provided policy and managerial direction for a wide range of agency activities, including spectrum, Internet policymaking, and Recovery Act broadband grant programs.

Between 2000 and 2009, Tom served as General Counsel of Fiberlink Communications in Blue Bell, PA. From 1994 -2000, he served in supervisory roles at the Federal Communications Commission before being named Senior Legal Adviser to FCC Chairman William Kennard, advising the chairman on broadband, common carrier, and mass media matters. Before joining the FCC, Tom was a telecommunications and litigation partner at the law firm of Winston & Strawn. He received his undergraduate and law degrees from the University of Virginia.

Panel 4: GPS Certification and Transition Plans

Milton Clary served as a Senior Federal Aviation Policy Analyst working for Overlook Systems Technologies in support of the Assistant Secretary of Defense for Networks and Information Integration. His primary responsibility involved analysis of national and global airspace architecture plans related to the Next Generation Air Transportation System (NextGen) in support of the Chairman of the DoD Policy Board on Federal Aviation. Apart from his work with the DoD, Milt supported the GPS Directorate during a special study to investigate the best approach to certify military GPS receivers compliance with appropriate Interface Specifications. Prior to supporting the Office of the Secretary of Defense, Milt was a Senior Requirements Analyst for the U. S. Air Force where he defined military requirements for enhanced Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) equipment necessary to access civilian controlled airspace, where he focused primarily on navigation requirements. Mr. Clary played a key role in determining the frequency location of the GPS L5 signal and brokered FAA & DoD agreements resolving spectrum issues related to the continued use of Link 16 in the U.S. He was instrumental in developing capability requirements that led to the certification of Precise Positioning Service (PPS) receivers for use in civil controlled airspace and conceived of the YMCA receiver as a means for accelerating advanced GPS capability in military aircraft. Mr. Clary is a rated Air Force navigator with nearly 2000 hours in F-4 Phantom and F-15E Strike Eagle aircraft, which includes 40 missions over Iraq. He is a graduate of both the Air Force Electronic Warfare School and Fighter Weapons School and holds a Master's degree in Aeronautical Science from Embry-Riddle Aeronautical University. Milt has worked for Overlook Systems Technologies since August of 2007.

Scott Bergmann is Vice President, Regulatory Affairs for CTIA – The Wireless Association®, where he is responsible for coordinating regulatory issues for the association affecting the wireless industry, including spectrum, broadband, infrastructure, and public safety policymaking. Mr. Bergmann previously served for over 10 years at the Federal Communications Commission in a wide range of positions, including Senior Legal Advisor to FCC Commissioner Jonathan Adelstein, Legal Counsel to the Chief of the Wireline Competition Bureau, and Deputy Chief of the Competition Policy Division. Mr. Bergmann received his B.A. from Duke University and his J.D. from the University of Southern California.

Ronald Borsato is a Principle Architect at Spirent Communications in Eatontown, NJ and is the Vice Chair of the CTIA's OTA Working Group. For the past eighteen years, he has worked at recognized companies at various levels of the supply chain in the wireless industry. He served as a technical advisor to the cellular sub-team of the LightSquared TWG. As a recognized industry leader in the development of radiated sensitivity testing, he has contributed to the CTIA Test Plan for Wireless Device Over the Air Performance as part of the CTIA OTA Working Group and chaired the CTIA GPS Subgroup during the development of the GPS OTA test methodology. He actively participates in 3GPP on LTE and OTA matters. He received his Masters of Science in Electrical

Engineering at the University of Texas at Arlington specializing in wireless communications and received his Bachelor of Science in Electrical Engineering at Virginia Polytechnic Institute and State University.

Karen VanDyke, Director, Positioning, Navigation, and Timing, U.S. Department of Transportation

Karen Van Dyke serves as the Director for Positioning, Navigation, and Timing (PNT) in the U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology (OST-R). Karen has been involved in navigation-related programs at the Volpe National Transportation Systems Center for over 20 years and currently is responsible for overseeing the navigation program and development of policy positions on PNT and spectrum in coordination with the Office of the Secretary of Transportation. Karen received her BS and MS degrees in Electrical Engineering from the University of Massachusetts at Lowell. She served as the President of the Institute of Navigation (ION) and is a recipient of the Award for Meritorious Achievement from the Secretary of Transportation and is a Fellow of the ION.

James A. Kirkland is Vice President and General Counsel of Trimble Navigation Limited, and is currently President of the GPS Innovation Alliance, a trade association whose members and affiliates are drawn from a wide variety of fields and businesses reliant on GPS. Prior to joining Trimble, he served as general counsel and executive vice president, strategic development at broadband carrier Covad Communications, and as senior vice president of spectrum development and general counsel at Clearwire Technologies, Inc., a privately held broadband wireless carrier. Among other spectrum related matters, while at Clearwire, Mr. Kirkland participated in the industry task force which developed recommendations for rule changes in the 2.5 GHz band to facilitate use of the band for broadband wireless. He began his career in private practice in the communications group at Mintz Levin Cohn Ferris Glovsky and Popeo. He currently serves as a director of the California Emerging Technology Fund, a non-profit organization dedicated to closing the digital divide in California. He also served on the Economic Development committee of Governor Arnold Schwarzenegger's broadband task force in California. Mr. Kirkland received his BA from Georgetown University and his J.D. from Harvard Law School.

Mr. Raymond J. Swider, Jr. is a program analyst responsible for policy and planning for positioning, navigation, and timing (PNT) in the Office of the Department of Defense Chief Information Officer (DoD CIO). His principal responsibility is the Global Positioning System (GPS) and management of this system as a resource for both civil and military users. He is also chair of NATO Capability Panel 2, which is charged with developing and maintaining alliance PNT standards (along with combat identification standards). Mr. Swider is a 1973 graduate of the US Air Force Academy. He spent over twenty-two years commissioned service as a pilot, intelligence officer, and staff officer. He retired in 1995 and began employment with the Federal Aviation Administration (FAA) as program manager for aviation systems using and augmenting GPS. In 2000, Mr. Swider left the FAA for his present position in the Department of Defense. In addition to his Academy education, Mr. Swider has a Masters degree from the Naval Postgraduate School and the Defense Language Institute in National Security Affairs. He also possesses a Masters degree in US History from George Mason University. He is a graduate of the USAF Air Command and Staff College, Air War College, and the Federal Executive Institute. Mr. Swider has acquired over four thousand flying hours in various military and civil aircraft. He is also a published author of several articles and a 1991 book analyzing historical trends in Soviet military reform accomplished while serving as a research associate at the University of Edinburgh.

NOTES:
