Federal
Communications
Commission

INCENTIVE AUCTIONS

LEARN Workshop

600 MHz Band Plan

May 3, 2013

AGENDA

9:30 am	**Opening Remarks** *Ruth Milkman, Chief, Wireless Telecommunications Bureau (WTB)*
9:45 am	**Band Plan Overview: Use of 600 MHz Spectrum *(presentation only)*** *Chris Helzer, Broadband Division, WTB*
10 am	**Topic: Potential Interference Challenges: Intermodulation and Harmonics** *FCC Moderators: Tom Peters, WTB* *Chris Helzer, WTB*
11:15 am	Morning Break
11:30 am	**Topic: Mobile Antenna Issues** *FCC Moderators: Tom Peters, WTB* *Chris Helzer, WTB*
12:15 pm	Lunch Break
1:15 pm	**Topic: Filter Pass Band Issues** *FCC Moderators: Tom Peters, WTB* *Michael Ha, OET*
2 pm	**Topic: Technical Flexibility** *FCC Moderators: Tom Peters, WTB,* *Robert Weller, OET*
3:15 pm	Afternoon Break
3:30 pm	**Topic: Band Plan Trade-Offs** *FCC Moderators: Tom Peters, WTB* *Evan Kwerel, OSP*
4:15 pm	**Conclusion**

FCC STAFF

Ruth Milkman, Chief, Wireless Telecommunications Bureau
Tom Peters, Chief Engineer, Wireless Telecommunications Bureau
Chris Helzer, Wireless Telecommunications Bureau
Michael Ha, Office of Engineering & Technology
Robert Weller, Chief, Technical Analysis, Office of Engineering & Technology
Evan Kwerel, Office of Strategic Planning & Policy Analysis
Jennifer Tomchin, Wireless Telecommunications Bureau

PARTICIPANT BIOGRAPHIES

Jay C. Adrick

Jay Adrick is a 48+-year veteran of the broadcast industry. He recently retired from Harris Broadcast and rejoined the company on a part time basis as a technology advisor. He is a former member of the board of directors and Vice Chairman of the Advanced Television Systems Committee (ATSC). He also chaired the Open Mobile Video Coalition Forum and served on both of the FCC Media Security and Recovery Councils. In his current role at Harris, he is focused on ATSC Mobile DTV, Mobile Emergency Alerting (M-EAS), the development of new television broadcast standards and regulatory and spectrum issues. Adrick is a Fellow of the Society of Motion Picture and Television Engineers (SMPTE) and a member of the Society of Broadcast Engineers (SBE) and IEEE BTS. He was the 2013 recipient of the National Association of Broadcasters Television Engineering Achievement Award. Adrick holds a Bachelor of Science degree in communications and a Master's degree in educational communications from Xavier University.

Christian Bergljung

Christian Bergljung has been with Ericsson since 2007 (ST-Ericsson 2009-2010). He has been active in several standardization fora; ETSI BRAN (WLAN and FWA), 3GPP GERAN (GSM), and is currently representing Ericsson and ST-Ericsson in 3GPP RAN4 (LTE). During 1999-2003 he was active in the ECC and ITU-R on the allocation of global spectrum for WLAN in the 5 GHz range.

Frank M. Caimi

Frank M. Caimi has more than 30 years of experience in antenna and RF systems and is a cofounder of SkyCross, Inc., a leading global designer and manufacturer of advanced antenna and RF solutions. Dr. Caimi received his Ph.D. degree in Electrical Engineering from Carnegie-Mellon University in Pittsburgh and has served as a consultant on communications and signal processing for industry and government.

Darryl J. De Gruy

Darryl J. De Gruy is the Strategic Planning Lead Engineer at U.S. Cellular. He has 20 years experience in the Mobile Wireless Industry. De Gruy has 26 years service in communications with the U.S. Army National Guard which include Radio Operator/Team Leader, Signal Battalion System Planning Officer, Signal Company Commander, and Brigade Communications Officer. De Gruy received his Masters of Electrical Engineering at Georgia Institute of Technology and is a Wireless Communications Professional with IEEE.

Tom Dombrowsky

Tom Dombrowsky is an Engineering Consultant with the law firm Wiley Rein LLP where he provides technical advice and guidance to clients concerning wireless spectrum matters. In particular, Dombrowsky specializes in spectrum policy matters, especially with respect to issues that affect commercial mobile service providers. Specifically, he has worked extensively with clients on government allocation and licensing of electromagnetic spectrum and advised a variety of wireless provider and manufacturer clients on technical issues associated with spectrum-related matters. Dombrowsky has been involved heavily in the National Broadband Plan spectrum reallocation discussions, including the Mobile Satellite Service ("MSS") proceedings and the recent proceedings concerning the reallocation of additional TV broadcast spectrum for mobile broadband services. Dombrowsky is a member of the Commerce Spectrum Management Advisory Committee ("CSMAC") that advises the Assistant Secretary for Communications and Information at NTIA on a broad range of spectrum policy issues. Prior to joining Wiley Rein, Dombrowsky held several positions within the FCC's Wireless Telecommunications and Private Radio Bureaus. Dombrowsky has a Bachelor of Science in Electrical Engineering from Lehigh University.

Richard B. "Rick" Engelman

Richard B. "Rick" Engelman is Director, Spectrum Resources, in Sprint Nextel's Legal and Government Affairs office, where he is responsible for developing proposals and technical comments in spectrum and licensing proceedings before the FCC, other federal agencies and Congress. Engelman has over thirty-five years of government and industry experience in communications engineering, regulatory policy, interference resolution, and spectrum management. Prior to joining Sprint in 2007, Engelman worked at the FCC for 30 years, holding various positions in the International Bureau, Office of Engineering and Technology, Field Operations Bureau, and Broadcast Bureau. He holds a BS in Electrical Engineering from Rose-Hulman Institute of Technology and is a Senior Member of the IEEE.

Harold Feld

Before becoming Legal Director at Public Knowledge, Harold Feld worked as Senior Vice President of Media Access Project, advocating for the public interest in media, telecommunications and technology policy for almost 10 years. Prior to joining MAP, Feld was an associate at Covington & Burling, and clerked for the D.C. Court of Appeals. Feld also writes Tales of the Sausage Factory, a progressive blog on media and telecom policy. In 2007, Illinois Senator Dick Durbin praised Feld and his blog for "[doing] a lot of great work helping people understand how FCC decisions affect people and communities on the ground."

George Harter

George Harter is Director of RAN Architecture and Development in the Technology Development Group for Clearwire. He is responsible for development of all RAN related products for both WiMAX and LTE. Prior to joining Clearwire, Harter served as a consultant to the broadband wireless industry for over 14 years as Co-Founder and President of WiCOM Consulting and Vice President of Engineering for Hardin and Associates. In his role as consultant, Harter focused on regulatory and RF related issues surrounding various broadband wireless frequency bands and was intimately involved in all aspects of developing the 2.5-2.7 GHz band here in the US. Harter was a consultant to the industry consortium of operators responsible for overhauling the FCC rules of operation and band plan in the EBS and BRS bands. He also worked for 9 years with the Consumer Electronics Division of General Electric in the RF Development Group.

Dale N. Hatfield

Dale N. Hatfield is currently a Senior Fellow at the Silicon Flatirons Center for Law, Technology, and Entrepreneurship and an Adjunct Professor in the Interdisciplinary Telecommunications Program – both at the University of Colorado at Boulder. Prior to joining the University of Colorado in 2001, Hatfield was the Chief of the Office of Engineering and Technology at the FCC.

Doug Hyslop

Doug Hyslop is a managing partner with Wireless Strategy, LLC, a firm providing business and engineering consulting services to wireless operators. With more than twenty years in the industry, his experiences include researching new technologies, directing technology development programs for national wireless operators, and designing and building wireless markets in major metropolitan areas. Recent experience with Wireless Strategy includes technology research and evaluation, deployment planning, spectrum valuation, and preparation of technical studies ranging from interference to technology performance to competitive evaluations.

Karri Kuoppamaki

Karri Kuoppamaki is the Director of Technology Policy for T-Mobile USA. In this role, Karri ensures alignment between T-Mobile USA Network Technology and the regulatory environment, specifically in the area of radio technology and spectrum policy. Karri also drives the strategic, long-term technology development activities both internally as well as towards external stakeholders. Kuoppamaki has almost 20 years of international experience in product marketing, product development and technology management in the wireless industry, and has worked in multiple countries in Europe, Africa and USA. He has a proven track record in introducing, defining and developing new technologies for the telecommunications market.

Brian Markwalter

Brian Markwalter is senior vice president of research and standards for the Consumer Electronics Association (CEA) ®, the preeminent trade association promoting growth in the $209 billion U.S. consumer electronics industry and owner of the International CES. Markwalter is responsible for overseeing CEA's ANSI-accredited standards development operation and extensive market research capability. Under Markwalter's direction, CEA hosts more than 70 committees, subcommittees and working groups that produce standards used in millions of consumer devices. CEA's market research has a rich 75 year history producing objective research, tracking sales data and forecasting trends. These programs have resulted in four Technology Emmy awards for CEA standards and give CEA members free access to nearly $1 million in annual market research. Markwalter holds five patents from prior work with Intellon Corporation, a home networking semiconductor company, and serves on a number of boards and government advisory committees. Markwalter received his bachelor's degree and master's degree in electrical engineering from the Georgia Institute of Technology and is a licensed professional engineer.

Prakash Moorut

Prakash Moorut is a Senior Research Specialist at Nokia Siemens Networks (NSN) within the Technology and Innovation organization with over 15 years of international experience focusing on spectrum regulation and strategy, standardization, spectrum sharing analysis and solutions to enable wireless technologies in various spectrum bands worldwide. His current focus is on LTE, Small Cells and Beyond 4G technologies. He is a co-chair of one of the CSMAC Sub-Working Groups to facilitate the repurposing of the 1695-1710 MHz and 1755-1850 MHz bands for wireless broadband from Federal Government use. He is also NSN's representative in Global TD-LTE Initiative, 4G Americas on spectrum related matters and on FCC's 2015 World Radio Conference Advisory Committee. Prior to NSN, he worked at Motorola in France and in the USA where he created and led a spectrum engineering research team distributed worldwide.

William Mueller

William Mueller has over 38 years experience in RF, with emphasis on component level design and RF front end architectures. For the last 28 years he has worked with Avantek-HP-Agilent-Avago (same work group, different names). He is presently the Strategic Marketing Manager at Avago, with a role of understanding evolving requirements for RF front end components in the mobile handset space, especially for multi-band multi-mode smartphones. Mueller is familiar with RF power amplifier and low noise amplifier design, as well as FBAR filter design. He is active in industry forums, standards bodies, and with chipset partners and service providers. He has presented numerous papers at symposia, and has one patent granted and 2 applied for relating to RF front end components. Mueller was an associate member of the TAC in 2012. Mueller received his BSE from Harvey Mudd College and MSEE from UC Berkeley.

Preston Padden

Preston Padden is Executive Director of the Expanding Opportunities For Broadcasters Coalition, a group of more than 40 TV stations potentially interested in participating in the Incentive Auction. Previously Padden spent 40 years in the communications and media business serving as President, Telecommunications and Television, News Corporation; President, ABC Television Network and Executive Vice-President of The Walt Disney Company.

Sanyogita Shamsunder

Sanyogita Shamsunder is the Director of Strategy at Verizon. In this role, she is responsible for network and product strategy built around new technologies. Previously, Shamsunder led the team that launched the first LTE devices in the industry. Prior to Verizon, she held positions at Lucent-Bell Labs, Sandbridge Technologies and Linquest Corporation. Shamsunder has led teams in all facets of the wireless business including device and network technology development, marketing, planning and strategy. She was also an assistant professor at Colorado State University. Shamsunder serves on the industrial advisory board for Electrical and Computer Engineering at Rutgers. Shamsunder received an MBA with honors from The Wharton School, University of Pennsylvania and a PhD in Signal Processing and Communications from The University of Virginia.

Delroy Smith

Delroy Smith is Principal Scientist & Project Leader in Philips Healthcare Wireless Monitoring Solutions. He is responsible for strategic technical leadership, including Philips' relationships with regulatory bodies, focusing on spectrum solutions to advance healthcare, research & development of medical wireless sensor technologies, and communication systems for direct patient applications such as WMTS and MBAN. Over the past four years he has driven the resolution of geopolitical and technical issues for MBAN innovation. Before joining Philips, he designed numerous wireless communication systems at companies such as Hewlett-Packard, Raytheon and Plessey. Smith holds a BSc (Honors) in electrical engineering and MSEE in communication & signal processing.

David Steer

David Steer is currently a Principal Member of Technical Staff with the Advanced Technology group of BlackBerry (formerly RIM) in Kanata (Ontario, Canada). Steer has spent over 30 years as a research engineer with major Canadian communications network manufacturers. Projects have involved circuit design, software design, security systems, mobile radios and networks. He has contributed to the development of standards including the 3GPP, IEEE 802, ETSI and ITU. Steer is a named inventor in about 100 patents and patent applications. He currently participates in the ETSI Reconfigurable Radio Systems (RRS) standards working group and with the NTIA CSMAC WG5. Current interests include cognitive radio systems, dynamic spectrum access, spectrum management and their applications to mobile devices. Steer received his BSc and MSc in engineering from Queen's University (Kingston, Ontario, Canada) in 1972 and 1974. He received a PhD (EE thesis in Radio Astronomy) from the University of British Columbia, Vancouver in 1984.

Neeti Tandon

Neeti Tandon has over 18 years of experience with AT&T in the field of wireless communications. She is a member of AT&T's Labs organization and in her current role is responsible for providing technical input to AT&T's spectrum strategy support. She has represented AT&T in various technical fora including, 4G Americas, GSMA SMG, Co-chair of the CSMAC AMT subgroup and recently was a member of US delegation of the HLCC Task Group on 700 MHz band discussions with Mexico. She has a Masters in Computer Science and is married with two children.

Victor Tawil

Victor Tawil joined the National Association of Broadcasters as senior vice president in June 2011. Tawil was previously senior vice president at the Association for Maximum Service Television (MSTV) where he was responsible for providing technology and telecommunication policy guidance and support to MSTV members. He served as the chairman of the Digital Television Station Project (WHD-TV), sponsored by the television and consumer electronics manufacturing industries and is a member of the Board of Directors of the Advanced Television Systems Committee (ATSC). Prior to joining MSTV in 1988, Tawil was with the FCC for 14 years, specializing in the fields of spectrum management, tropospheric propagation and system engineering. He has worked extensively in the areas of broadcasting, satellite, wireless communications and new communication technologies. During his tenure at the FCC, Tawil served as a U.S. delegate on a number of international and ITU Plenipotentiary Conferences and bilateral negotiations. Tawil holds an MSE in Electrical Engineering from the University of Rochester, and a BSE from New York University. He is a member of the International Union of Radio Scientists (URSI), Institute of Electrical and Electronic Engineers (IEEE), the Society of Motion Picture and Television Engineers (SMPTE) and Tau Beta Pi.

Sumit Verma

Sumit Verma joined Qualcomm in July 2006, and works in the RF Systems Department of Qualcomm's chip division-- Qualcomm Mobile and Computing. He lead the development of HSUPA, HSPA+ and Dual Carrier HSPA transmitter technology before taking the lead on the very first LTE launch, based on Qualcomm's MDM9K chipset. After helping successfully launch LTE, Verma has been driving the RF standardization efforts for Carrier Aggregation technology, as well as supporting upcoming spectrum issues such as the 600 MHz US auction. Verma's current title is Principal Engineer. Verma has an MSEE degree from the University of Southern California and a BSEE degree from California State Polytechnic University - Pomona.

Stephen Wilkus

Stephen Wilkus is a director in the Alcatel-Lucent Wireless Chief Technology Office as a Distinguished Member Technical Staff. He is a Senior member of the IEEE and a member of the Alcatel-Lucent Technical Academy. In his current role, he supports wireless operators in their use of spectrum and in their radio access network planning. He joined Bell Laboratories Lucent Technologies (then part of AT&T), in 1986 as a Researcher and Developer of Surface Acoustic Wave filters used in undersea cable and wireless products. His interest in wireless communications lead to work on IEEE 802.11 and other standards and regulatory work in the AT&T Chief Architect's Office. In 1991, he spearheaded the development of a novel wireless electronic shelf label system sold through NCR using RFID technology. He later co-led the first team to demonstrate High Speed Packet Access (HSPA) in 2003 and was the solutions architect for the first satellite/terrestrial hybrid DVB-SH system. Wilkus received the B.S. degree in physics and the M.S.E.E. degree from the University of Illinois, Urbana, in 1981 and has been a panelist at several FCC workshops on wireless regulatory policies.