



Federal
Communications
Commission



INTEROPERABILITY FORUM

Friday, March 4, 2011

9:00 AM—3:30 PM

Commission Meeting Room

Federal Communications Commission

445 12th Street, SW

Washington, DC 20554



AGENDA

- 9:00 am Welcoming Remarks**, James Arden Barnett, Jr., Rear Admiral (Ret.), Chief, Public Safety and Homeland Security Bureau (PSHSB), Federal Communications Commission (FCC)
- 9:10 am Guest Speaker**, William Carrow, President, Association of Public Safety Communications Officials—International (APCO); Communications Chief, Delaware State Police
- 9:15 am Panel 1 – How to ensure nationwide interoperability for public safety broadband utilizing LTE 4G Technology**
- 10:30 am** Break
- 10:40 am Panel 2 – Solutions for the deployment of Radio Access Network (RAN) equipment to achieve nationwide Operability and Interoperability**
- 12:00 pm** Lunch Break
- 1:00 p.m. Introductory Remarks for the Afternoon Session:** Amy Levine, Special Counsel to FCC Chairman Genachowski
- 1:10 pm Panel 3 – Core Network, Security and Services**
- 2:15 pm** Break
- 2:30 pm Federal and Secondary Use of the Public Safety Broadband Network: An Overview** — Special Counsel Erika E. Olsen, PSHSB, FCC
- 2:45 pm Panel 4- Where We Go from Here**
- 3:30 pm** Adjourn

9:15 AM—10:30 AM

Panel One—The FCC has determined that LTE is the technology that will best provide a baseline for required interoperability and operability for public safety broadband communications. This technology enjoys commercial deployments, worldwide 3GPP standards, and a wide ecosystem of devices and network equipment. While the technology builds on a nationwide architecture to deploy the network of networks for public safety, issues impacting interoperability need to be addressed.

Moderator:

Behzad Ghaffari, Systems Engineering Chief, Emergency Response Interoperability Center (ERIC), PSHSB, FCC

Panelists:

Dr. Kenneth Budka, Senior Director, Advanced Mission Critical Communications, Bell Labs, Alcatel-Lucent

Brian Daly, Director, Core & Government/Regulatory Standards, AT&T Mobility Services, LLC

Dr. Dennis Martinez, Chief Technology Officer, Harris Corporation Radio Frequency (RF) Communications Division

Emil Olbrich, Lead Project Engineer, Public Safety Communications Research (PSCR), National Institute of Standards & Technology (NIST)

10:40 AM—12:00 PM

Panel Two—To ensure nationwide Interoperability, a minimum level of Operability must be established. Without a minimum level of Operability, public safety user devices may not be supported and nationwide Interoperability will not be accomplished. This panel addresses the deployment of RAN in Public Safety Broadband networks nationwide, in order to facilitate interoperability and a minimum level of performance for public safety users.

Moderator:

Pat Amodio, RF Engineering Chief, ERIC, PSHSB, FCC

Panelist:

Jeff Anderson, Wireless Broadband System Architect, Motorola Solutions, Inc.

Mark Funka, Director of Network System Performance, Verizon Wireless

Mark McDiarmid, Vice President, Radio Network Engineering, T-Mobile USA, Inc.

Allan Sadowski, Information Technology Manager; North Carolina State Highway Patrol (NCSHP); Security Lead, North Carolina Department of Crime Control and Public Safety (CC&PS)

John Santo, Executive Director, Wireless Systems Program Office, Department of Homeland Security (DHS), Customs and Border Protection (CBP)

1:10 PM—2:15 PM

Panel Three—As the nationwide interoperable broadband network is built for public safety, a set of security features will help to meet public safety expectations for a reliable and secure communication. Additional nationwide core services such as authentication or application support may be considered with various implementation scenarios. Sharing resources between the broadband network and the emerging NG911 system may offer opportunities for additional functionality and cost savings.

Moderator:

Professor Henning Schulzrinne, Columbia University & Engineering Fellow, FCC

Panelist:

Walter Magnussen, Director of Telecommunications, Texas A&M University (TAMU) & Director of Internet2 Technology Evaluation Center (ITEC)

Byron J. Neal, Chief Network Architect, Syniverse Technologies

John Powell, Interoperability Chair, National Public Safety Telecommunications Council (NPSTC)

Jack Suess, Vice President of Information Technology & Chief Information Officer, University of Maryland Baltimore County; Chair, InCommon Steering Committee

2:45 PM—3:30 PM

Panel Four—How do we ensure the network that is deployed takes advantage of the cost efficiencies of the commercial technology market? How do we ensure the network is spectrally efficient? How do we ensure the network evolves continually so that public safety is not left with outdated networks as in years past?

Moderator:

Jennifer A. Manner, Deputy Bureau Chief, PSHSB, and Acting Director, ERIC, FCC

Panelists:

Bill Price, Director Broadband Programs, Division of Telecommunications, State of Florida

Dennis Roberson, Vice Provost for Corporate Relations and Strategic Initiatives, and Computer Science Research Professor, Illinois Institute of Technology; President and CEO of Roberson and Associates, LLC

Bill Schrier, Chief Technology Officer & Director, Department of Information Technology, City of Seattle

Edmond J. Thomas, Technology Policy Advisor, Wiltshire & Grannis

Pat Amodio, Chief, Radio Frequency Engineer, ERIC, PSHSB, FCC

Pat Amodio has over 30 years experience in the design, deployment and operational management of various radio frequency systems. His experience includes all aspects of commercial wireless and land mobile network design and deployment including radio planning & optimization; wireless switching; base station equipment design, operation and maintenance; data transmission; cell site design and construction; transport facilities planning and management. Pat earned a patent for a wireless security system including a test feature for locating emergency radio frequency transmissions and is a Senior Member of the Institute for Electrical and Electronics Engineers (IEEE).

Jeff Anderson, Wireless Broadband System Architect, Motorola Solutions, Inc.

Jeff Anderson is a Wireless Broadband Systems Architect for Motorola Solutions, working in the Chief Technology Office. In this role, Jeff is responsible for RF design techniques for LTE radio access networks to meet mission critical Public Safety requirements. Jeff has 22 years of experience in Public Safety communications networks, including field engineering, product development and advanced technology and research. He is active on the technical, regulatory, and operational aspects of Public Safety, both in Motorola Solutions and in the industry. Jeff was chairman of the Telecommunications Industry Association's TR-8.5 Data & Signaling committee from 2002 – 2007 and over the past several years has contributed to broadband working groups in the National Public Safety Telecommunications Council (NPSTC) and the National Institute of Standards of Technology (NIST) Public Safety Communications Research (PSCR) programs. Jeff holds a B.S. in Electrical Engineering from Southern Illinois University.

James Arden Barnett Jr., Rear Admiral (Ret.), Chief, PSHSB, FCC

Chief Barnett is responsible for overseeing FCC activities pertaining to public safety, homeland security, emergency management and disaster preparedness, and represents the Commission on these issues before federal, state, and industry organizations. Chief Barnett served 32 years in the United States Navy and Navy Reserve, retiring in 2008. His last active duty assignments were Deputy Commander, Navy Expeditionary Combat Command and Director, Naval Education and Training in the Pentagon. Before coming to the FCC, Chief Barnett was a Senior Research Fellow at the Potomac Institute for Policy Studies, a policy think tank focusing on science and technology issues of importance to the nation, including cyber conflict and cyber security. From 1984 to 2001, he was a senior partner at Mitchell, McNutt and Sams, P.A. in Tupelo, Mississippi with a governmental law practice representing municipalities, counties, law enforcement agencies, schools and local government officials.

Dr. Kenneth Budka, Senior Director, Advanced Mission Critical Communications, Bell Labs, Alcatel-Lucent

Dr. Kenneth C. Budka is Senior Director of Advanced Mission-Critical Communications at Alcatel-Lucent's Bell Labs and is a member of the FCC's Emergency Response Interoperability Center (ERIC) Public Safety Advisory Committee (PSAC). He leads Alcatel-Lucent's next-generation public safety wireless research team, a team dedicated to the development of interoperable public safety broadband wireless solutions using open-standard, commercial wireless technologies. This work led to Alcatel-Lucent's deployment of the National Capital Region's Regional Wireless Broadband Network, the Nation's first 700 MHz Public Safety Broadband Network built using open-standard commercial technologies, Alcatel-Lucent's proposal to the FCC to transform the data portion of the Public Safety 700 MHz band to an all-broadband block, early advocacy with Government and Public Safety officials in favor of constructing a nationwide public safety broadband network, and the Nation's first over-the-air LTE transmissions in the Public Safety 700 MHz band. Dr. Budka and his team have contributed to the Department of Homeland Security's (DHS) SAFECOM "Statement of Requirements for Public Safety Wireless Communications and Interoperability," design of Project 25's Inter RF-Subsystem Interface (ISSI), and development of methods of achieving interoperability between Project 25 and public safety broadband systems. Dr. Budka received his Ph.D. and M.S. in Engineering Science from Harvard University and a B.S. in Electrical Engineering summa cum laude from Union College in Schenectady, NY. He is a Senior Member of the IEEE and holds 20 patents.

William “Bill” Carrow, President, Association of Public Safety Communications Officials—International (APCO); Communications Chief, Delaware State Police

William “Bill” Carrow has been active in public safety communications for over 29 years, the last 11 serving as Communications Chief of the Delaware State Police. His duties include the overall administration of three 9-1-1 PSAP's, a computer data center and a communications technical support unit. In 2004 he managed a Mobile Command Center procurement project which saw cost savings of over \$200,000 and delivery of the unit six weeks ahead of schedule. Bill received the Leadership in Technology award from the International Association of Chiefs of Police in 2004 for his accomplishments in the field of communications interoperability with Delaware's neighbors. He was also named Civilian of the Year for the Delaware State Police in 2004. Bill has been a member of APCO's Mid-Eastern Chapter since 1997 where he has served on the local Board as Recording Secretary and President. He chaired the chapter's annual conference for five years, and was Chair of APCO International's 73rd Annual Conference in Baltimore, Maryland in 2007. In October, 2005 Bill was named Group Leader of APCO Operations, and served in that capacity for two years. Bill was very involved in the Project RETAINS Team for two years, making presentations in local and regional conferences as well as at the annual conference.

Brian Daly, Director Core & Government/Regulatory Standards, AT&T Mobility Services, LLC.

Brian K. Daly manages the team responsible for the strategic standards engineering for the 3GPP evolved packet system, the IP multimedia subsystem, femto cells, the commercial mobile alert system, regulatory aspects including emergency services and CALEA, homeland security, and wireless-wireline convergence. He has significant accomplishments in the telecommunications industry that include the development of new network architectures and features for both wireline and wireless networks. Brian is recognized as an active contributor and technical expert in various industry standards organizations, from the development of the first standards for wireless Personal Communication Services, early TDMA digital cellular standards, ANSI-41 intersystem operations, and 2G/3G/4G GSM, UMTS, and LTE systems including the IMS and the Evolved Packet Core. He has a working knowledge of wireless security standards, homeland security aspects including citizen-to-citizen, citizen-to-authority, and authority-to-citizen communications, and regulatory aspects including public safety/law enforcement requirements. Brian was appointed to the Commercial Mobile Alert Service Advisory Committee where he led the Communications Technology Group, and was active in the development of industry standards for CMAS. Brian is a member of the FCC's Technological Advisory Council and the Communication Security, Reliability and Interoperability Council (CSRIC) working groups for Location Accuracy and CAP Introduction, and a contributor to the CSRIC Transition to NG9-1-1 working group. He currently is Chair of the North American Fraud Forum and Security Group and Wireless Alerts Task Force under the GSM Association's North American Regional Interest Group. Brian, as an amateur radio operator, an Emergency Coordinator in the Western Washington Medical Services Communications Team and is active in the Seattle Office of Emergency Management-sponsored Auxiliary Communications Services. Brian holds a M.S. in Electrical Engineering from Arizona State University with an emphasis in electromagnetic engineering (antennas and microwaves) and communication systems.

Mark Funka, Director of Network System Performance, Verizon Wireless

Mark A. Funka's organization is responsible for the radio frequency design, overall voice and data performance and capacity management of the EVDO, 1XRTT and LTE networks in Washington, Baltimore and Virginia Markets. In Mark's 18 years of experience with Verizon Wireless he has worked in RF Design and System Performance as well as the development of the RF Capital Plan for the NE Area. Prior to joining Verizon Wireless, he worked as an International Manufacturing Engineer in Canada, Mexico and the United Kingdom. Mark is a graduate of Robert Morris University, where he received a bachelor's degree in Industrial Management.

Behzad Ghaffari, Systems Engineering Chief, ERIC, PSHSB, FCC

Behzad Ghaffari has over 20 years of professional experience in both public and private sectors. He joined the FCC in 2001 and has since been involved in a variety of engineering tasks supporting a wide range of policy work. He has provided the commission with technological and analytical expertise in the areas of networking, broadband, and public safety to just mention a few. Before joining the FCC, Behzad spent over 10 years in the telecommunications industry in various technical and leadership positions, including 8 years with AT&T Bell Labs and AT&T Labs. Behzad holds a BS, MS, and a PhD from University of Maryland, all in Electrical Engineering, majoring in Communications.

Amy Levine, Special Counsel to FCC Chairman Genachowski

Amy Levine is Special Counsel to FCC Chairman Genachowski. Ms. Levine works in the Office of Strategic Planning and Policy Analysis and is responsible for issues concerning public safety and spectrum. Ms. Levine works closely with the Public Safety and Homeland Security Bureau on the Commission's top public safety priorities, with a special emphasis on the creation of a nationwide, interoperable public safety broadband network and continued enhancement of E911 and NG911 technologies. Ms. Levine coordinates with the Wireless Bureau, the Media Bureau and the Office of Engineering and Technology regarding the Commission's efforts to make available and ensure more efficient use of spectrum, including through the innovative concept of voluntary incentive auctions. Ms. Levine most recently served as principal communications policy advisor to Congressman Rick Boucher, former Chairman of the Subcommittee on Communications, Technology, and the Internet, and Congressman John Dingell, former Chairman of the Committee on Energy and Commerce in the U.S. House of Representatives. She was Legislative Counsel to Senator Claire McCaskill, where she was responsible for advising the Senator on communications, technology, and transportation matters. Ms. Levine spent more than five years as an associate at Covington & Burling, where her practice centered on communications, media and technology issues. Ms. Levine received her J.D. from Yale Law School, where she was Essays Editor of the Yale Law Journal, and graduated magna cum laude from Yale University.

Walter Magnussen, Director of Telecommunications, Texas A&M University (TAMU) & Director of Internet2 Technology Evaluation Center (ITEC)

Dr. Walt Magnussen has his Bachelor's and Master's degrees from the University of Minnesota and his Doctorate from Texas A&M University. He is currently the Director of Telecommunications at Texas A&M University and the Director of the TAMU Internet2 Technology Evaluation Center (ITEC). ITEC projects have included funding from the Departments of Commerce and Transportation as well as the National Science Foundation all involving Next Generation 911 deployment projects. Walt currently is serving on the FCC's Communications Security, Reliability and Interoperability Council (CSRIC) and the Emergency Response Interoperability Center (ERIC) Public Safety Advisory Council (PSAC).

Jennifer A. Manner, Deputy Bureau Chief, PSHSB, and Acting Director, ERIC, FCC

Jennifer A. Manner is Deputy Bureau Chief and has a focus on strategy and new technology other related issues. She previously worked as a Principal at ZComm Strategies LLC, where she was a consultant on telecommunications regulatory policy issues. Before that, Jennifer was Vice President of Regulatory Affairs at SkyTerra Communications, LLC, where she handled the company's domestic and international regulatory and policy issues. Before joining SkyTerra, she served as Senior Counsel to FCC Commissioner Kathleen Abernathy with responsibility for wireless, international and new technology issues. She joined the Commissioner's office after working at MCI Communications Corporation, later WorldCom, Inc., as Associate Counsel for Foreign Market Access and then as International Wireless Services and Director of International Alliances. Prior to this position, Jennifer was an associate in the Communications Group at Akin, Gump, Strauss, Hauer and Feld, L.P. Before joining Akin, Gump, Ms. Manner was an Attorney-Advisor at the FCC. Jennifer currently serves as an adjunct professor at Georgetown University Law Center and the Washington College of Law at

Jennifer A. Manner, Deputy Bureau Chief, PSHSB, and Acting Director, ERIC, FCC (continued)

American University. She has published several books on telecommunications issues and has written numerous law review articles. She received her B.A. from the State University of New York at Albany, from which she was recently awarded the Distinguished Alumni Award for Political Science. She received her J.D. cum laude from New York Law School and LL.M. with distinction from Georgetown University Law Center. Jennifer is admitted to practice in Washington, D.C., New York and Connecticut.

Dr. Dennis Martinez, Chief Technology Officer, Harris Corporation RF Communications Division

Dr. Dennis Martinez is the Chief Technology Officer for the Harris RF Communications Division. Harris RF Communications is the leading global supplier of secure radio communications and embedded high-grade encryption solutions for military, government and commercial organizations. The company's Falcon® family of software-defined tactical radio systems encompasses manpack, handheld and vehicular applications. Falcon III is the next generation of radios supporting the U.S. military's Joint Tactical Radio System (JTRS) requirements, as well as network-centric operations worldwide. Harris RF Communications is also a leading supplier of assured communications® systems and equipment for public safety, utility and transportation markets — with products ranging from the most advanced IP voice and data networks to portable and mobile single- and multiband radios. Dr. Martinez has spent most of his career in the development of advanced telecommunication products and systems, serving mission-critical markets including National Defense, Public Safety, Critical Infrastructure Industries and Enterprises that rely on wireless communications. His recent focus is in the application of emerging broadband technology in these mission-critical markets. He has authored patents in the fields of Wireless Communications and Image Processing Systems. Dr. Martinez received his BSEE, MSEE, EE, and Ph.D. from the Massachusetts Institute of Technology, all in the field of Electrical Engineering and Computer Science.

Mark McDiarmid, Vice President, Radio Network Engineering, T-Mobile USA, Inc.

Mark McDiarmid has 20 years of experience in the wireless industry in both domestic and international organizations. These experiences have developed Mark's knowledge and expertise of systems engineering, and business planning and technology development. Previously, Mark played a key role in the development of several new businesses that provided innovative products and services to the industry. Currently, Mark serves as Vice President, Radio Network Engineering and Product Validation for T-Mobile USA, where he leads several teams of industry leading engineers focused on creating robust, operationally efficient, and economic radio network designs. His responsibilities include strategy and development of radio spectrum and access network technology, radio system design and product validation. Recently, Mark was responsible for defining the evolution and system design of T-Mobile USA's HSPA+ mobile broadband network including the design and operationalization of new radio network transport solutions based on IP and Ethernet.

Byron J. Neal, Chief Network Architect, Syniverse Technologies

Byron (B.J.) Neal is Chief Network Architect at Syniverse Technologies, and has served in that capacity since June 2010. He was previously Chief Engineer and Senior Technologist within the Federal Communications Commission working on the Omnibus Broadband Initiative (National Broadband Plan). He is a telecommunications network engineer and management professional with over 17 years of experience in the telecom service provider industry. Byron has held Vice President, Director, Manager, Technologist and Engineering management positions within Inter-Exchange Carrier, Competitive Local Exchange Carrier, Internet Service Provider and Competitive Access Provider firms. He has developed practical experience in planning, designing, engineering, implementation and production support of distributed Next Generation Network architectures delivering voice, data, video and signaling solutions. He started his career as a telecom engineer in 1993 after obtaining a B.S. in Electrical Engineering from the West Virginia University Institute of Technology and progressed through multiple levels of management serving at TransGlobal Communications, Intermedia Communications, Z-Tel Technologies, Syniverse Technologies, and the Federal Communications Commission. Byron is currently a member of the IEEE Communications Society.

Emil Olbrich, Lead Project Engineer, Public Safety Communications Research (PSCR), National Institute of Standards & Technology (NIST)

Emil Olbrich is currently the Lead Project Engineer with the Department of Commerce at the NIST Office of Law Enforcement Standards working on broadband initiatives and supporting the Public Safety Communications Research (PSCR) programs. His work is primarily focused on 700 MHz wireless broadband technologies in public safety communications, with a focus on how LTE can support their needs. Prior to this position he was Senior Consultant with Protiro Inc. working at the Institute for Telecommunication Sciences (ITS) in Boulder, CO supporting the PSCR and NIST OLES teams. Emil has over 17 years of experience in the field of wireless telecommunications. He has worked primarily in R&D at some of the largest telecommunication companies in the world - such as Motorola, Qualcomm and Ericsson. His scope of work includes testing, development & deployment of the some of the first commercial CDMA networks; early development of HDR (EVDO and DORA); lead project engineer for the 2002 Salt Lake City Winter Olympics; Total Project Manager for China Ministry of Information Industry 3G testing in China; and lead project engineer for 700 MHz Public Safety LTE national test bed. His past experience with cellular based networks is helping to advance public safety communications into the next generation of wireless communications.

Erika E. Olsen, Special Counsel, PSHSB, FCC

Erika Olsen is Special Counsel to the Chief of the Commission's Public Safety and Homeland Security Bureau. In this role, Ms. Olsen is responsible for addressing policy initiatives for the Bureau including those related to public safety spectrum, including the 700 MHz band, 911 and E911, the Communications Assistance for Law Enforcement Act (CALEA), and the Emergency Alert System (EAS). Before joining the Bureau, Ms. Olsen served as the Acting Legal Advisor to FCC Chairman Kevin J. Martin for wireless and international issues, and previously served as the Deputy Chief of the Telecommunications Access Policy Division in the Commission's Wireline Competition Bureau. Prior to joining the Commission, Ms. Olsen was a partner in the telecommunications practice of a large international law firm. Ms. Olsen received her B.A. from Yale University, and her J.D., magna cum laude, from the Washington and Lee University School of Law, where she was elected to the Order of the Coif.

John Powell, Interoperability Chair, National Public Safety Telecommunications Council (NPSTC)

John Powell has over 32 years of law enforcement experience at the municipal and state levels as an officer and supervisor for two San Francisco area agencies. He implemented and/or managed several major projects including a statewide 800 MHz trunked radio system and an E-911 computer aided dispatch center for the University of California. He has served on numerous local, state, national and international committees, including the FCC's Public Safety Wireless Advisory Committee (PSWAC) and as chair of the Interoperability Subcommittee of the FCC's 700 MHz Public Safety National Coordination Committee (NCC). Since leaving the University of California in 2002, Mr. Powell has consulted extensively on issues and projects related to advanced telecommunications technologies, including broadband, interoperability, software defined radio and Voice over IP (VoIP) for the Department of Homeland Security (DHS) and Department of Justice (DOJ), and the Executive Office of the President of the United States. One of his first responsibilities at DHS was to serve as principal author of the SAFECOM Interoperability Continuum. He served as the first chair of California's FCC-chartered Statewide Interoperability Executive Committee (CalSIEC) from 2003 to 2008, and currently chairs the Interoperability Committee and Software Defined Radio Working Group within the National Public Safety Telecommunications Council (NPSTC). He is NPSTC's representative to the US DOJ GLOBAL Wireless Security Working Group, a member of the Board of Directors of the Wireless Innovation Forum (formerly the Software Defined Radio Forum), a member of the SAFECOM Executive Committee & Emergency Response Council within DHS, and is a charter member of the Project 25 Steering Committee. John has supported the DHS Interoperable Communications Technical Assistance Program (ICTAP) since its inception in 2002 providing Public Safety communications-related subject matter expert support to local and state governments. He is a member of the International Association of Chiefs of Police (IACP) Law Enforcement Information Management Section and the IACP

John Powell, Interoperability Chair, NPSTC (continued)

Communications and Technology Committee. He is a life member and International Past President of the Association of Public Safety Communications Officials - International (APCO), a Fellow of the Radio Club of America, and a member of IEEE. He holds a Bachelor's Degree in Electrical Engineering & Computer Science from the University of California at Berkeley and a California Junior College teaching credential. In 2002 at the end of his law enforcement career, he received the UC Berkeley Chancellor's Distinguished Service Award and Statewide Police Chief's Outstanding Service Award.

Bill Price, Director Broadband Programs, Division of Telecommunications, State of Florida

Bill Price is the Director of Broadband Programs for the Division of Telecommunications for the State of Florida. In that role, Bill is responsible for broadband planning, strategies and broadband programs development and management. The Division of Telecommunications provides state and local government jurisdictions with telecommunications services including voice, video and data. The Division provides public safety wireless communications using narrowband LMR systems and interoperability services that leverage the State's broadband data MPLS network. Bill has 30 years of experience in technology services. His career began in telecommunications with the United States Air Force (USAF) Strategic Air Command and Control system through X.25 service providers to Internet Services with Sprint and BellSouth.

Dennis Roberson, Vice Provost for Corporate Relations and Strategic Initiatives, and Computer Science Research Professor, Illinois Institute of Technology; President and CEO of Roberson and Associates, LLC

Dennis A. Roberson is Vice Provost for Corporate Relations and Strategic Initiatives, and is a Research Professor in Computer Science at Illinois Institute of Technology. In this capacity, he has responsibility for IIT's relationships with its various corporate partners. This includes management responsibility for IIT's Career Management Center and its Technology Transfer Office. He also serves as the focus for the implementation of IIT's Strategic Plan, and supports the development of new research centers, and the successful initiation and growth of IIT related technology-based business ventures. Dennis is an active researcher and educator in the wireless networking arena and is a co-founder of IIT's Wireless Network and Communications Research Center (WiNCom). His specific research focus areas include dynamic spectrum access networks, spectrum occupancy measurement and analysis, spectrum management, and wireless interference and its mitigation. He is the President and CEO of Roberson and Associates, LLC, a consulting firm primarily focused on meeting the technology and technology management needs of various government and commercial organizations and their immediate suppliers. He also serves on the governing and/or advisory boards of several technology-based companies including Advanced Diamond Technology (ADT), the Caerus Institute, Cleversafe and Zarlink. Prior to IIT, he was Executive Vice President and Chief Technology Officer at Motorola. He has an extensive corporate career including major business and technology responsibilities at IBM, DEC (now part of HP), AT&T, and NCR. He is and has been involved with a wide variety of technology, cultural, educational and youth organizations currently including the governing Boards of FIRST and HCJB Global, the National Advisory Board for the Boy Scouts of America and its Information Delivery Committee, the FCC Technological Advisory Council, and the International Advisory Panel for the Prime Minister of Malaysia. He is a frequent speaker at universities, companies, technical workshops, and conferences around the globe. Dennis has B.S. degrees in Electrical Engineering and in Physics from Washington State University and a MSEE degree from Stanford.

P. Allan Sadowski, Information Technology Manager, North Carolina State Highway Patrol (NCSHP); Security Lead, NC Department of Crime Control and Public Safety (CC&PS)

Allan Sadowski is a retired USAF Major with a B.S. in Electrical Engineering from North Carolina State University and a M.S. in Information Systems Technology from Hawaii Pacific University. After retiring from the USAF, Allan supported specialized Department of Defense (DoD) communications for several years before returning to North Carolina thirteen years ago to work for the North Carolina State Highway

P. Allan Sadowski, Information Technology Manager, NCSHP; Security Lead, NC Department of CC&PS (continued)

Patrol. He was hired to migrate the NCSHP Legacy SNA network to a TCP/IP network and is currently the IT Manager for the NCSHP. His current responsibilities include managing: all NCSHP WAN networking, TCP/IP and P25 infrastructure for VIPER - Voice Interoperability Program for Emergency Responders (800MHz Trunk system supporting 53,000+ First Responders), voice and data radio communications interoperability, telemetry infrastructure for NC Emergency Management and State Climatologist, and IT Security lead for the North Carolina Department of Crime Control and Public Safety. Allan is currently working to further data communications to first responders by merging the use of Public Safety Band LTE technology, Commercial Wireless Carrier LTE and 3G technology, White Space technology, datacasting, and WiFi technologies. Allan is a member of APCO, USDoJ/NIJ Communications Technology Working Group, FCC ERIC Technical Advisory Committee, and is the Digital Subject Matter Expert for NC's State Interoperability Executive Committee.

John Santo, PMP, Executive Director, Wireless Systems Program Office, Department of Homeland Security, Customs and Border Protection

In his 33 year federal career, John Santo established the U.S. Customs and Border Protection's (CBP) Wireless Systems Program Office (WSPO) its mission is to improve operational effectiveness and interoperability through the wireless delivery of voice, data, and video for situational awareness, command, control, and coordination in the tactical field operational environment. Currently, as the Executive Director, John is leading a level 1 program to modernize wireless tactical communications within CBP and has initiated a pilot demonstrator project to explore converging Land Mobile Radio (LMR) with data and video applications on a common tactical wireless broadband infrastructure, eliminating the need for separate LMR and data tactical networks. Previously he served as the Executive Director for the Enterprise Networks & Technology Support Division (ENTS). Stewarding departmental shared IP WAN network and enterprise communications services, John also served as the interim Executive Program Manager for CBP's Secure Border Initiative (SBI) to lead a replanning effort aimed at getting the program on a better footing while recruiting a new permanent Executive Program Manager. He also established and led CBP's Technology Operations Division serving as Executive Director for a staff of more than 2000 providing operations and maintenance for a vast technology infrastructure that included data centers, WAN, LANs, surveillance, detection and tactical communications networks. Other leadership positions in which John has served include Director of the National Law Enforcement Communications Center (NLECC) for CBP; Deputy Chief Information Officer (CIO) for CBP and Director of the Enforcement Support Division for U.S. Customs Office of Investigations. He has been awarded the 2009 Meritorious Executive Presidential Rank Award; Department of the Treasury, Albert Gallatin Award; FCC Chairman Award, and Treasury Secretary's Certificate. John has a M.S. in Management from Troy State University; B. S. in Mathematics, Science and Technology from the State University of New York.

Bill Schrier, Chief Technology Officer & Director, Department of Information Technology, City of Seattle

Bill Schrier is the Chief Technology Officer (CTO) for the City of Seattle and also serves as the director of the City's Department of Information Technology (DoIT), reporting directly to Mayor Michael McGinn. Seattle has a population of about 600,000 residents and a City government of about 11,000 employees. As CTO, Bill is responsible for setting standards and policies governing the use of information technology in City government. As Director of DoIT, his responsibilities include managing the city's data center, computing services, information security, web site, municipal television station, community technology, electronic mail system, 800 MHz trunked public safety radio system, telephone network, and data communications network. He is a current member and past chair of the King County Regional Communications Board (KC-RCB) which operates the public safety 800 MHz trunked radio system of 15,000 radios and 29 sites serving King County and Seattle. He presently chairs the City of Seattle Law-Safety-Justice Information Technology steering committee which has just completed a \$19 million upgrade to the City's computer-aided dispatch, records management systems and mobile applications for Seattle Police and Fire. He's been honored as a fellow of the Public Safety Foundation of America. Bill is a retired officer with the U.S. Army Corps of Engineers and holds a Masters in Public Administration from the University of Washington.

Professor Henning Schulzrinne, Columbia University & Engineering Fellow, FCC

Professor Henning Schulzrinne is a Julian Clarence Levi Professor of Computer Science at Columbia University. He received his undergraduate degree in economics and electrical engineering from the Darmstadt University of Technology in Germany and his MSEE degree as a Fulbright scholar from the University of Cincinnati, Ohio. He received his Ph.D. from the University of Massachusetts in Amherst, Massachusetts. He was a member of the technical staff at AT&T Bell Laboratories, Murray Hill and an associate department head at GMD-Fokus (Berlin), before joining the Computer Science and Electrical Engineering department at Columbia University. From 2004 to 2009, he served as chair of the Department of Computer Science. Henning has published more than 200 journal and conference papers, and more than 50 Internet RFCs. Protocols co-developed by him are now Internet standards used by almost all Internet telephony and multimedia applications. Currently, he is an Engineering Fellow at the Federal Communications Commission (FCC).

Jack Suess, Vice President of Information Technology & Chief Information Officer, University of Maryland Baltimore County; Chair, InCommon Steering Committee

Jack Suess has spent his career at the University of Maryland Baltimore County (UMBC), progressing from student consultant to CIO during the last 21 years. He spent the first 17 years leading the systems programming and network engineering group. During that time he led projects that developed the Unix infrastructure on campus, designed the campus network infrastructure, and led the campus web development strategy. Jack is presently directing UMBC's enterprise business system implementation of Peoplesoft and is a member of the UMBC Executive Council. Jack was principal investigator for UMBC's vBNS award, has served on multiple NSF and NIH panels. He is also an active participant in the Internet2 Early Adopters Middleware Initiative, and a subcommittee chair on the Educause Security Task Force. He has given numerous presentations on web technology, portals, and authentication and authorization services

Edmond J. Thomas, Technology Policy Advisor, Wiltshire & Grannis

Edmond Thomas, in his 40 plus year career, has held senior positions in business management, R&D, satellite and cellular/land based radio system design, strategic planning, operations, regulatory matters, and telecommunication/data network design and implementation. Immediately after leaving the position of Chief Engineer of the Federal Communications Commission in 2005, he joined the law firm of Harris, Wiltshire & Grannis as a partner specializing in technical analysis, technical policy formulation and business strategy. In 2003, for the role he played at the FCC in advancing digital wireless communication he was selected by *Forbes* Magazine's as one of five people in the magazine's E-gang. In the same year he was named by *Wired* Magazine as one of the four most influential technical people in Washington. One of his recent notable successes at Harris, Wiltshire & Grannis was that he led the White Spaces Coalition to victory in the FCC white spaces proceeding resulting in a favorable FCC order which authorized the unlicensed use of vacant TV channels. Ed is presently a member of the Board of Directors of Petra Solar Inc. and Validus Corp. He is also a member of the Corporate Advisory Board of Spectrum Bridge. Prior to joining the Commission, he served as President and CEO of MMRadiolink, a manufacturer of millimeter wave digital radio equipment based in the U.K. He also served as President and CEO of RSL USA, a \$500 million dollar international telecommunications company. In 1998, for his work at RSL, he was named as one of the 50 most influential people in long distance by *Phone Plus* Magazine. Prior to his tenure at RSL USA, Ed was President of Science and Technology at Bell Atlantic and Bell Atlantic's CTO. In this position he was responsible for the development of the firm's wire line and wireless new products and services. He also had full operational and P&L responsibilities for Bell Atlantic's large customer data products and services. He has also served on the academic advisory boards of the University of Colorado, the Polytechnic University and the State University of New York College of Technology.

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