

Massive Broadband Network Densification - Unleashing the Opportunities of 5G

**A Technology and Policy Workshop
Held in Partnership with the Georgetown University
Center for Business and Public Policy's
Project on the Evolution of Regulation and Innovation**

Wednesday, October 25, 2017



**Georgetown University School of Continuing Studies
640 Massachusetts Ave NW
Washington, DC 20001**

Chair: Peter Rysavy, [Rysavy Research](#)

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BACKGROUND

This fifth annual spectrum technology and policy workshop will examine the issues and opportunities created by the massive broadband network densification taking place across the United States. A fundamental transformation of the country's mobile broadband networks is already underway as providers continue to extract more capacity and performance from 4G networks; however, the massive network densification that will come with 5G network buildout will result in a huge increase in wireless network capacity. Simultaneous with the deployment of small cells is the related fiber densification that is occurring and which will be needed for small cell backhaul connectivity, as well as for evolved HFC and FTTP networks.

These ultra-dense network will unleash an immense wave of innovation in the forthcoming decade, including more choices in consumer broadband, smart cities, smart transportation, autonomous driving, and the internet of things. Speakers will address items such as:

- The types of innovation and use cases these ultradense networks will support.
- The 5G deployment timeline and small-cell buildout forecast.
- The key technology developments making these new networks possible.
- The impediments that could delay, and in some cases, are already delaying densification efforts.
- The role of spectrum and siting policies in supporting deployment.
- The relevance of ultra dense networks to the future of the digital economy.

Lunch will be served at the workshop.

PRELIMINARY AGENDA

**Workshop. Wednesday, October 25, 2017.
8:30 a.m. – 3:00 p.m.**

Agenda and schedule subject to change.

9:00– 9:40 [Registration/Breakfast](#)

9:45 – 10:00 Opening Remarks and Welcome by Georgetown and Wireless Technology Association

10:00– 11:00 Panel Discussion: Ultradense Networks—Technology and Spectrum Elements

Topics: Technology aspects of densification, spectrum (3.5 GHz, 5G, WRC, harmonization), 5G standardization and schedule, architecture (including distributed intelligence), and ecosystem. Panelists will include operators, infrastructure vendors, and other technology providers.

Moderator: Peter Rysavy, President, Rysavy Research

Panelists:

- David Wolter, AVP, Radio Technology and Architecture, **AT&T**.
- Dr. Robert Howald, VP Network Architecture, **Comcast**.
- Jason Caliento, Senior VP Network Strategy, **Mobilitie**.
- Art King, Director of Enterprise Services & Technologies, **SpiderCloud Wireless**.
- Mark Cudak, Bell Labs Fellow, **Nokia**

11:00 – 11:30 Networking Break

11:30 – 12:30 Panel Discussion: Who Pays? Funding America's 5G Infrastructure

Topics: Much attention has been paid to the cost of building out 5G networks, with some analysts even suggesting that it could be less expensive to build out 5G than it has cost to build out earlier iterations of mobile broadband networks. But projections for hundreds of thousands of small cells and dense fiber networks say otherwise. This panel will delve into the issue of whether 5G is truly a less expensive undertaking than building out 3G or 4G networks, and what implications the cost of build holds for network operators and their customers. This panel will also discuss the emerging use cases for 5G that could upend existing business models around building and operating broadband networks, and forever change the financial and economic viability of high speed broadband connectivity in both urban and rural areas.

Moderator: Jennifer Fritzsche, Managing Director, Wells Fargo Securities.

Panelists:

- Aaron Blazar, Senior Partner, **Atlantic-ACM**.
- Patrick Brogan, Vice President - Industry Analysis, **USTelecom**
- Anna-Maria Kovacs, Visiting Senior Policy Scholar, **Georgetown Center for Business and Public Policy**
- Mark Stodden, Analyst, **Moody's Investor Service**

12:30 – 1:30 Lunch

1:30 – 2:30 Panel Discussion: 5G Networks and Public Policy - Friends or Foe?

Topics: As network operators continue to perfect their 4G network infrastructures and begin the task of building out 5G, questions abound regarding whether there are unique policy issues that could either help or hinder the network densification that 5G requires. This panel discussion features policy experts who will explore whether policy issues at both the state and federal level can have an effect on how quickly and effectively densification can happen. Issues like infrastructure siting dominate most discussion about 5G network build but are there other, equally important topics that need to be resolved in order to minimize the regulatory barriers to more and faster 5G build. Our experts will also explore whether and how 5G infrastructure can be used by rural and urban localities seeking to embrace smart city capabilities.

Moderator: Carolyn Brandon, Senior Industry and Innovation Fellow, Georgetown Center for Business and Public Policy.

Panelists:

- Jamie Hastings, Senior Vice President, External and State Affairs, **CTIA**.
- Tamara Preiss, Vice President, Federal Regulatory Affairs, **Verizon**.
- Kathleen Q. Abernathy, Counsel, **Wilkinson Barker Knauer, LLP and Former FCC Commissioner** (2001-2005)
- Morgan Reed, President, **ACT Online**

2:30 – 3:00 Panel Discussion: Informal networking

WORKSHOP LOCATION

The workshop will be held at:

**Georgetown University School of Continuing Studies
640 Massachusetts Ave NW
Washington, DC 20001**

REGISTRATION

The registration deadline is end of day, October 24, 2017.

WTA members: free. If you are a WTA member and don't have the discount code, please contact me. The following organizations are WTA members and people from these organizations do not have to pay the workshop fee to attend: AT&T, Ericsson, Georgetown University, Growth Impact Solutions, Instep Group, Intel, MCCI, Mobile Computing Promotion Consortium (MCPC), NetMotion Wireless, Rysavy Research, and Sierra Wireless.

Press and government agencies: free.

Organizations affiliated with Georgetown University: free. Contact us for a discount code.

Non-members: \$295 for registration through October 1st, \$495 October 2nd to October 24th.

If you intend to come, please register soon.

[Click here to register using our Eventbrite registration process.](#)

HOTEL AND TRAVEL INFORMATION

Nearby hotels include the following. We do not have a room block.

Marriott Marquis
901 Massachusetts Ave NW, Washington, DC 20001
<http://www.marriott.com/hotels/maps/travel/wasco-marriott-marquis-washington-dc/>

Embassy Suites
900 10th Street NW,
<http://embassysuites3.hilton.com/en/hotels/district-of-columbia/embassy-suites-washington-dc-convention-center-WASCCES/index.html>

Marriott Renaissance
999 Ninth St NW
<http://www.marriott.com/hotels/travel/wasrb-renaissance-washington-dc-downtown-hotel/>

Hampton Inn
901 6th Street
<http://hamptoninn3.hilton.com/en/hotels/district-of-columbia/hampton-inn-washington-downtown-convention-center-WASHHHX/index.html>

Hotel Monaco
700 F St NW
<http://www.monaco-dc.com/>

PRESENTERS AND PANELISTS (alphabetical by last name)

Kathleen Abernathy
Special Counsel, Wilkinson Barker Knauer



Ms. Abernathy returned to Wilkinson Barker Knauer bringing years of top-level government and corporate experience. She was elected to the Board of Directors of Frontier Communications as an independent director in 2006 following her term as a Commissioner at the Federal Communications Commission from 2001 to 2005. In 2010 she joined the company as Chief Legal Officer and Executive Vice President, Regulatory and Governmental Affairs. She was on the leadership team that oversaw a number of strategic acquisitions that eventually grew Frontier to a Fortune 250 company. She is also a member of the Board of Directors of ISO New England, serving in that capacity since 2012. Prior to her term as an FCC Commissioner, Ms. Abernathy worked for a number of different telecommunications companies and law firms. She has received numerous awards in recognition of her professional accomplishments and has taught as an adjunct professor at Georgetown University Law Center and Catholic University's Columbus School of Law.

Aaron Blazar
Senior Partner, ATLANTIC-ACM



Aaron Blazar is a Senior Partner at ATLANTIC-ACM, a strategic consulting firm that serves telecom operators, infrastructure providers, vendors and investors. Mr. Blazar advises clients on issues related to product innovation, growth strategy, market entry, go to market strategy, M&A target identification, acquisition due diligence, among other advisory services. For operators and vendors, Mr. Blazar has provided trusted advice that has led to the launch of new product and channel strategies, generating in excess of \$500M of new revenue along with on-going guidance supporting multi-billion-dollar service portfolios.

Recently, Mr. Blazar has advised equipment vendors on new product development, helped a voice services provider transition into new service areas, developed business cases for dark fiber market entry, supported multiple global service providers in understanding wireline product portfolio performance / competitive issues, and developed fiber/ wireless infrastructure market entry models. For investors, Mr. Blazar has advised on thesis development, target identification, due diligence and improvement of portfolio company performance. Recent investor engagements have focused on wireline telecom operators, wireless infrastructure, fiber infrastructure, network engineering / deployment/ support vendors, network equipment distribution vendors, OSS / BSS platforms, and voice / unified communications service platforms. Mr. Blazar regularly speaks at C-Level industry thought leader and investment research events.

Mr. Blazar has a Bachelor of Arts in Economics from Colby College. In his spare time, Aaron enjoys time with family, skiing, trail running, gardening and sailboat racing.

Carolyn Brandon

Senior Industry and Innovation Fellow, Georgetown Center for Business and Public Policy



Ms. Brandon formed strategic consulting firm Whitworth Analytics LLC in 2011 to provide decision support, and strategic policy counsel to companies in the high tech, broadband and wireless sectors. Ms. Brandon is also a Senior Industry and Innovation Fellow at the Georgetown Center for Business and Public Policy where she focuses on competition and regulatory policy as applied to networked industries and emerging markets.

Prior to forming Whitworth Analytics, Ms. Brandon served as Vice President, Policy for CTIA-The Wireless Association where she worked for five years with CTIA's more than 200 members to develop strategic, national public policies for the U.S. commercial wireless industry. Brandon focused on policy matters impacting industry structure, competition, innovation and technology development.

Before joining CTIA in 2004, Ms. Brandon was a partner in the Washington, D.C. boutique law firm Wilkinson Barker Knauer, LLP where for 12 years she represented wireless telecommunications providers in proceedings and transactions before the Federal Communications Commission, state public utility commissions, U.S. bankruptcy courts and the U.S. Securities and Exchange Commission.

Voted one of the "Top Ten Women in Wireless" by the publishers of Wireless Week, Ms. Brandon has served on the Advisory Board of the TechPolicy Summit, and was selected to represent the wireless industry on the Federal Communications Commission's Consumer Advisory Committee, an official Federal Advisory Committee. Carolyn has served two terms on the Executive Committee of the Federal Communications Bar Association and two terms on the Steering Committee of the District of Columbia Bar Association's Computer and Telecommunications Committee. Her pro bono activities include representing prospective adoptive parents before the DC Superior Court, Family Division. She currently serves on the Board of Trustees of Green Hedges School, a pre-K through 8 independent school located in Vienna Virginia. Ms. Brandon also serves as an Advisory Board Member to the Northern Virginia Children's Science Museum.

Patrick Brogan

Vice President - Industry Analysis, USTelecom



Patrick Brogan is Vice President for Industry Analysis at USTelecom, a major trade association representing the nation's leading broadband telecommunications companies. He is a senior research professional with a proven ability to generate value through analytical content and information design. His professional interests include economics, innovation, and policy and he has deep expertise in broadband, the Internet, and information technology. At USTelecom, Mr. Brogan publishes research highlighting industry trends and economic impacts. He works with association and industry executives to integrate research into public advocacy, including federal regulatory filings, Congressional testimony, executive speeches, media statements, and infographics. His work is often cited by industry and government officials, analysts, academics, and the press. His previous experience includes consulting for a Big Four professional services firm and helping to launch an investment research startup.

Jason Caliento
SVP Network Strategy, Mobilitie



Jason serves as the Senior Vice President of Network Strategy where he leads Network Engineering, Real Estate, Government Relations, Construction Standards, Logistics and Operations for Mobilitie. Jason has 18 years of experience in the telecommunications industry focused on network design and deployment, including some of the nation's largest roll-outs of new technologies and infrastructure. Prior to joining Mobilitie, Jason served as the Chief Operating Officer of SAC Wireless, a Nokia Company, and led the National PMO for Clearwire. Jason holds a BA from Illinois Wesleyan University and a JD from the DePaul University College of Law.

Mark Cudak
Bell Labs Fellow, Nokia



Mark is a Nokia Bell Labs Fellow and a Department Head in the Small Cells Research Group with Nokia Bell Labs in Chicago. His research focuses on cellular network evolution to meet the continued growth in data consumption and expanding diversity of wireless applications. Recently, his team has focused on 5G MIMO system simulations and has made numerous contributions to the 3GPP 5G New Radio work item.

Prior to joining Nokia in 2011, Mark was with Motorola for 20 years where he research was on wireless data systems including APCO 25 and cellular standards from 2G to 4G. Mark has over 40 issued patents, was a Motorola Dan Noble Fellow and holds a M.S. in electrical engineering from the University of Illinois at Urbana-Champaign.

Jennifer Fritzsche
Managing Director, Wells Fargo Securities



Jennifer Fritzsche is a Managing Director in the equity research department at Wells Fargo Securities, LLC, where she focuses on the telecommunications services sector. She started in telecom equity research in 1996 with EVEREN Securities. At EVEREN, she was promoted to Senior Analyst after serving two years as an Associate Analyst on the telecom research team. In 1999, She joined the First Union/Wachovia research platform following First Union's acquisition of EVEREN. In 2000, she tied for second in the Best Up and Comers category in Institutional Investor's annual vote. She was ranked eighth (of 60 firms) in the Reuters 2001 Survey of Fund Managers in the category of wireless telecom services and was selected as the top wireless analyst by Starmine, a leading provider of objective ratings of equity securities analysts. In 2004, she placed sixth on the Top Ten Analyst list in the annual Forbes.com Wall Street's Top Analysts annual stock-picking survey. Also in 2004, she placed second among wireless services analysts in The Wall Street Journal Best of the Street survey. More recently, for 2006, Forbes magazine recognized Ms. Fritzsche and her team as the number one stock picker in the wireless industry, and number two stock picker for the wireline industry. She was also ranked number two overall on the Top Ten Analyst list in the annual Forbes.com Wall Street's Top Analysts annual stock-picking survey for 2006. Within this survey, she was recognized as one of the top 10 stock pickers from a universe of 4,500 sellside analysts across all industry sectors. Most recently, in May 2007, she was recognized as the number two wireless analyst for 2006 by The Wall Street Journal. She has a BA degree in history from the College of the Holy Cross in Worcester, Massachusetts, and an MBA degree from Northeastern University in Boston, Massachusetts where she graduated summa cum laude.

Jennifer has a BA in history from the College of the Holy Cross in Worcester, Massachusetts and an MBA from Northeastern University in Boston, Massachusetts where she graduated summa cum laude.

Jamie Hastings

Senior Vice President, External and State Affairs, CTIA



Jamie Hastings is responsible for the association's interaction with state and local government agencies as well as external affairs outreach efforts.

Ms. Hastings joined CTIA in 2011, after spending 11 years working for T-Mobile USA as its Vice President of State Legislative Affairs. She previously worked at Omnipoint Communications, Inc., where she was the Director and Senior Counsel in the legal and regulatory affairs department. She served as the Director of Government Relations and Government Operations for the County of Westchester. Ms. Hastings was also the Corporation Counsel for the City of Yonkers, New York.

She earned a Juris Doctor from Union University Albany Law School and graduated from Fordham University with a bachelor of arts in English. Ms. Hastings also has a certificate from the JFK School of Government at Harvard University.

Dr. Robert Howald

VP Network Architecture, Comcast



Dr. Howald has 30+ years of technology and executive experience in commercial and military communications systems. He is Vice President, Network Architecture at Comcast, focusing on evolution of broadband systems and services, network architectures, and emerging technologies. Dr. Howald has taught graduate courses in communications and wireless systems engineering, has published over 150 papers, and has multiple patents issued and pending. He has a BSEE and MSEE from Villanova, a Ph.D. in ECE Systems from Drexel, and an MBA from DeSales University.

Art King

Director of Enterprise Services & Technologies, SpiderCloud Wireless, Board Member of Small Cell Forum



As the Director of Enterprise Services & Technologies, Mr. King leads the development of enterprise services definitions and business case propositions for customers and partners. Mr. King is a Small Cell Forum Board member and a Vice Chair of the Services Working Group. Mr. King was formerly the Mobility/Collaboration lead in Global Architecture for Nike Inc. where he held various global roles over 10 years. Prior to Nike, he led the build out of two multinational engineering and consulting organizations for an IP Services network vendor in the service provider industry. Mr. King holds a BS in Computer Engineering from Portland State University. LinkedIn: <http://www.linkedin.com/in/kingart>

Anna-Maria Kovacs

Visiting Senior Policy Scholar, Georgetown Center for Business and Public Policy



Anna-Maria Kovacs is a Visiting Senior Policy Scholar at Georgetown University's Center for Business and Public Policy. Her expertise is in industry analysis and her area of focus is on the interplay between public policy and investment. Dr. Kovacs has followed the communications industry for over thirty years, either as a financial analyst or as a consultant. She was the Founder and President of Regulatory Source Associates LLC, which provided investment professionals with analysis of the impact of federal and state regulation on investment in the telecommunication and cable industries. She recently founded Strategic Choices to provide consulting on financial, strategic and regulatory issues that impact the communications industry. Dr. Kovacs' MBA is from Harvard Business School. Her Ph.D. is from Harvard University, in Comparative Literature, with a focus on the impact of economic and social history on literature. Her B.A. is from Boston University is in Economics and English. She holds the CFA Charter.

Tamara Preiss

Vice President, Federal Regulatory Affairs, Verizon



Tamara is Vice President, Federal Regulatory Affairs, at Verizon, where she is responsible for regulatory and policy matters before the FCC, including wireless, video, and universal service. She joined Verizon in 2008 after ten years at the FCC, where she served as Chief of the Pricing Policy Division in the Wireline Competition Bureau and Assistant General Counsel in the Office of General Counsel. Prior to the FCC, Tamara was an associate at Sidley & Austin. She received her undergraduate and law degrees from the University of Virginia

Morgan Reed

Executive Director, ACT | The App Association



Morgan Reed is a widely known and respected expert on the government impact on technology innovation. As ACT's Executive Director, Morgan specializes in issues involving application development relating to privacy, intellectual property, competition, and small business innovation.

His expertise and knowledge has been sought by the House and Senate in multiple hearings while his commentary and insight is a major draw for news networks including Fox Business News, MSNBC, CNBC, CNN, and ABC. He is consistently quoted in the trade and popular press, ranging from the Wall Street Journal and the Washington Post to Ars Technica and Slashdot.

Peter Rysavy
President, Rysavy Research



Peter Rysavy is the president of Rysavy Research LLC, a consulting firm that has specialized in wireless technology since 1993. Projects include analysis of spectrum requirements for mobile broadband, reports on the evolution of wireless technology, evaluation of wireless technology capabilities, strategic consultations, system design, articles, courses and webcasts, network performance measurement, test reports, and acting as expert in patent-litigation cases. Clients include more than 75 organizations.

Peter is a broadly published expert on the capabilities and evolution of wireless technology. He has written more than 150 articles, reports, columns, and white papers, and has taught more than 40 public wireless courses and webcasts. He has also performed technical evaluations of many wireless technologies including cellular-data services, municipal/mesh Wi-Fi networks, Wi-Fi hotspot networks, mobile browser technologies, wireless e-mail systems, and social networking applications.

From 1988 to 1993, Peter was vice-president of engineering and technology at Traveling Software (later renamed LapLink) where projects included LapLink, LapLink Wireless, and connectivity solutions for a wide variety of mobile platforms. Prior to Traveling Software, he spent seven years at Fluke Corporation where he worked on data-acquisition products and touch-screen technology. More information is available at <http://www.rysavy.com>.

Mark Stodden
Analyst – Moody's Investors Service

Mark Stodden joined Moody's Investors Service in 2010, and is an analyst for the US and Latin American telecom sector. Prior to joining Moody's, Mr. Stodden worked at Train, Babcock Advisors LLC, and at AT&T where he was the Director of Finance from 2004 through 2006.

Dave Wolter
Assistant Vice President – Radio Technology & Architecture



Dave is responsible for driving the assessment and development of AT&T's advanced radio technologies including LTE-Advanced, unlicensed, and 5G technologies. This consists of analysis, simulation, testing and providing technical contributions to global standards. Dave's responsibilities also include RAN architecture definition driving SDN/NFV based approaches into the RAN, and technical support on spectrum issues and strategy.

Dave has been with AT&T Labs since 1991. Prior to this he was with McDonnell Douglas Aircraft Company, holding various technical

and management positions in applied research, where he performed avionics, communication, and reconnaissance systems simulation and led a team in the analysis and specification of advanced stealth aircraft communication systems. Dave holds a BS and MS in Electrical Engineering from Washington University in St. Louis.

INFORMATION FOR PRESENTERS AND PANELISTS

The following information is for people presenting at the WTA workshop:

- Panelist are welcome to give up to a 3 minute introductory statement about the organization they represent and themselves.
- Keynote and any presenters must provide their presentations (PDF or PPT) at least one week prior to the workshop to allow for copying to the members area of the WTA Web site, as well as to allow detailed questions for discussion.
- Emphasis should be on industry and technology at large, versus selling your product (limit of 3 slides). Consider items such as compatibility, technical alternatives, standardization, deployment considerations, interoperability, certification and adoption.
- Generally, a dynamic and attentive audience of key industry stakeholders attend each workshop, representing a broad spectrum of the mobile computing industry, including operators, infrastructure vendors, device vendors, middleware providers, policy makers, and application developers.
- We will provide a video projector and computer for presenting. Presenters should use their own presentation templates.
- **Because WTA workshops are considered public meetings, please do not include any confidential or proprietary information. Please do not mark your presentations with any terminology indicating confidential or proprietary information.**

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