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Unleashing the Economic Benefits
of Mobile Broadband Expansion

Content

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Abstract

Broadband is economic fuel, and wireless broadband access is an increasingly vital form of telecommunications. To ensure widespread, fair access and a competitive market environment, thoughtful regulations that promote efficient, timely deployments and encourage wireless broadband investment by the private sector are key for cities to achieve lasting, mutually beneficial relationships with wireless carriers and network infrastructure providers.

A recent informal survey of various municipal officials, municipal trade associations, wireless infrastructure companies and deployment experts showed that there is an inconsistent base of knowledge about wireless infrastructure on the part of municipalities and their representatives. Wireless industry stakeholders have a strong desire to cooperate and collaborate with municipal officials on infrastructure deployments, including towers, Distributed Antenna Systems (DAS) and small cells.

Numerous questions were cataloged and distilled into the most frequently asked questions (FAQs) advanced by municipalities (see Appendix). To promote understanding of the economic development benefits and some of the technical aspects of mobile broadband infrastructure, The Wireless Infrastructure Association's Innovation & Technology Council (ITC) has developed this report to begin to answer these frequently asked questions from municipalities regarding such infrastructure and its benefits. This report is part of a larger effort by WIA to educate its members, municipal trade organizations and municipal officials to support collaboration and understanding among interested parties and promote mobile broadband network investment for the benefit of citizens, businesses and local jurisdictions.

Economic Benefits of Mobile Broadband

As the World Bank has concluded, "Broadband is not just an infrastructure. It is general-purpose technology that can fundamentally restructure an economy." Analysis by the World Bank found that in developing economies, every 10-percent increase in broadband penetration resulted in increased Gross Domestic Product (GDP) growth of 1.21 percent in developed economies.[1] Attracting high-tech businesses is crucial to growth plans for many municipal and county governments, and businesses of all types depend on high-speed broadband services and will not consider relocation or new locations unless local infrastructure meets their needs. High-tech companies bring high-paying jobs to a community, which boosts tax revenues for cities and school districts.

Downtown business districts, small businesses and tourist destinations can provide a better visitor experience by ensuring greater access to high-speed wireless networks. Mobile broadband also helps ensure enterprise service continuity. Businesses, first responders and other city services often rely on both wired and wireless broadband connections to ensure they can continue to operate if one network is disrupted.

The Brookings Institute has estimated that "for every 1 percentage point increase in broadband penetration in a state, employment is projected to increase by 0.2 to 0.3 percent per year."[2] Local governments benefit from increased broadband access for many of the same reasons, such as improving communications and efficiency in their own workforce.

Adequate wireless access is important for citizens as well. According to the most recent federal survey of wireless substitution, about half of Americans (48.3%) have only cellular phones in their homes, an increase of nearly 3 percent from the previous year. More than two-thirds of all adults ages 25-34 are living in wireless-only households.[3] With half of the population relying solely on mobile networks for everyday communication, including 911 access, these networks are vital. Citizens who have "cut the cord" or have never had landline service can only get dependable wireless service if local infrastructure supports enough coverage and capacity.

Broadband access can increase economic activities in both urban and rural settings. It can improve urban life and reduce carbon footprints, traffic and pollution by enabling decentralized, remote work capabilities. In rural areas, having affordable broadband access can improve educational and cultural opportunities and reduce the desire to move to cities. It also can provide new economic opportunities for residents to establish online-only home businesses.[4]

Emerging technologies hold additional promise for improving citizens' lives and municipal operations. A recent study by Parks Associates and AARP found that 117 million Americans will require caregiving assistance by 2020, and connected health technology in the home is expected help alleviate some of the caregiving burden as well as promote general wellness.[5] Telehealth applications are emerging that can monitor a patient's condition remotely via wireless devices, provide patients with information to assist in managing their health and enable patients and doctors to interact via a broadband video connection for diagnostics and treatment. Robust wireless networks will be essential to achieve reliable home health services for the population at large.

In addition, the Internet of Things (IoT) and machine-to-machine (M2M) communications offer new possibilities for improved municipal operations and more efficient resource allocation. Research firm Gartner predicts that 6.4 billion connected IoT devices will be in use in 2016, up 30 percent from 2015; and that this number will reach 20.8 billion by 2020.[6] "Smart city" applications such as wireless utility meters, wireless parking meters, remote control of street lighting, municipal fleet tracking and management, and the use of wireless sensors for adaptive traffic management are already in use in the United States and around the world. In 2015, the White House announced a $160 million program to invest in development of IoT technologies that will help municipalities address traffic congestion, fight crime, foster economic growth and improve delivery of city services.

Because mobile broadband infrastructure must be deployed locally, it also means local jobs. Even outside contractors will spend dollars on-site for hotels, meals and other services, widening the economic impact of infrastructure investment.

Mobile Broadband for Public Safety

With half of the nation's population living in homes with only mobile phones, lack of access to reliable wireless 911 services costs lives. Emergency weather warnings, Amber Alerts and other safety-oriented public announcements increasingly are disseminated via mobile networks because this can be done more quickly than with traditional methods and reach people who have opted out of a home landline phone. Communities are using new services like community Facebook pages to disseminate information and people are using their smartphones to access that material.

Because so many people rely on wireless-only telecommunications, federal regulations for emergency services have evolved to address this concern. The Federal Communications Commission (FCC) has developed a series of initiatives and requirements around Enhanced 911 (E911) services for mobile-phone users. The FCC expects that the ability to send a text message to 911 will become widely available. As such, in 2014, the agency ordered that if a 911 call center requests the ability to receive text messages to 911, wireless carriers must deploy the capability in that area within six months of the request.[7] The FCC also has introduced requirements that demand more precise location information for mobile-phone users who call 911, including what floor they are on in a multi-story building. Wireless carriers must have adequate local infrastructure and coverage so 911 callers receive the help they need and so first responders can locate 911 callers and communicate efficiently and effectively when every second counts.

First responders also are taking advantage of mobile broadband in their daily work. For example, mobile devices can be used to take and share incident photos and video with other officers to increase situational awareness and improve incident management, rapidly transmit pictures of missing persons or suspects to officers in the field and to collect on-scene visual evidence. The First Responder Network Authority, or FirstNet, is a federal entity in the planning stages of a nationwide broadband public-safety network to support such uses by first responders. In the meantime, these users are forced to rely on narrowband systems or to rely on commercial network providers.

Technology Deployment Solutions

Mobile network sites have three primary requirements: power, a support structure for antennas and associated fiber and other cabling equipment. Good design and engineering are crucial to successful deployment. Wireless infrastructure solutions include:

Macrocellular sites or macrocells. Macrocellular Base Transceiver Stations (BTS) traditionally are mounted on large telecommunications towers or rooftops and provide wide swaths of network coverage for thousands of users at once. These sites often hold network equipment for multiple wireless carriers on a single tower to provide coverage to the surrounding areas. They typically have hard-wired fiber connections to the rest of the network and back-up power generators. Macrocellular sites provide the best coverage when a device has a line-of-sight connection with the tower. Trees and other foliage, buildings, hills and valleys and other natural and man-made obstructions can interfere with wireless coverage from macro sites. Indoor environments may not always receive sufficient coverage from macrocellular sites alone.

Distributed Antenna Systems (DAS). DAS installations are often found inside large venues such as stadiums, hotels and hospitals; they also can also be deployed outdoors to cover high-density neighborhoods and city centers. Distributed Antenna Systems consist of a network of antennas often connected by fiber back to a central processing unit that connects it to the rest of the network. A DAS can be a "neutral-host" system, meaning that it can provide service for more than one wireless carrier.

Small cells. Small cells are a significantly smaller version of the traditional macrocell because the attributes of a cell tower – like radios and antennas – are compressed into a low-power, easy-to-deploy radio device. Small cells typically have a range varying from 10 meters to a few hundred meters. Microcells and picocells are designed to support hundreds of users and can be used in smaller venues that are not necessarily inside the range of a macrocellular network. Femtocells are tiny radios that can be deployed in residences to augment signal strength indoors. Small cells typically support a single frequency band and technology and transmit less power than a remote radio head or DAS node.

Small cells are used by carriers either to offload traffic from the macrocellular network in a high-density, short-range environment or to strengthen the range and efficiency of a mobile network. They can be integrated with DAS, LTE and Wi-Fi technologies and incorporated into street furniture, including utility poles and street lights. These sites still require power and backhaul, such as a fiber connection, to the rest of the network. Small cells increase network capacity and reliability by bringing the network closer to the end-user's device. They are typically deployed in a surgical manner, bringing extra coverage and capacity to the precise spot where carriers need service.

Cloud Radio Access Network (C-RAN). C-RAN is a relatively new concept in wireless networks and involves deploying multiple radio points connected to a central baseband processing unit while coordinating the end points to minimize interference among the individual cells. C-RAN can be deployed in a macrocellular or small-cell configuration.

Small cells and DAS provide greater network density to support the growing wireless demand from both consumers and businesses. Small cells and DAS lighten the load carried by macro sites, improving coverage and capacity for all users by concentrating it where it is needed most. They also improve indoor coverage, where construction materials can weaken cellular signals, otherwise resulting in poor voice quality and slow data connections or no connection at all. For example, LEED-certified buildings often have low-emission glass, which blocks radiofrequency signals.

A New Role for Municipalities in Mobile Broadband Deployments

The Communications Act designates the FCC as the primary agency responsible for rules governing telecommunications services, and largely reserves to states and local governments primary responsibility for rules governing access to and management of public rights-of-way (ROW).[8] Public ROWs are critical pathways for broadband networks, including ducts, conduit, utility poles and street furniture. The cost of access to this infrastructure affects the economics of fixed and mobile broadband networks. Municipalities must balance concerns about construction safety and aesthetics with the benefits that broadband will offer to their citizens. Since a number of entities, including electric utilities, telecommunications providers, cable companies and others can access public rights-of-way under federal and state laws, users of the ROW must be both stewards of such rights and follow municipal procedures to ensure work is done safely and does not negatively impact other collocated entities. Local jurisdictions can help to ensure that proper processes are followed so potential concerns are mitigated.

Wireless carriers and infrastructure providers spend billions of dollars each year to improve wireless networks, but those dollars are spread across the entire country. Regulations vary across jurisdictions and it is a time-consuming, complex and costly process to deploy network improvements and new sites. Given budget and timeline constraints, new services and improvements will be brought first to communities where it makes the most economic sense.

Carriers and infrastructure providers want to provide better service, but they can only do so if they can physically improve their networks in a timely and cost-efficient manner. They need municipalities to manage access to local ROWs to achieve better wireless broadband coverage.

Clear, infrastructure-friendly policies and regulations are needed that balance concerns about construction safety, operating environment and aesthetics with meeting wireless carriers' and infrastructure providers' timelines and budgets. Regulations that prevent or discourage a wireless carrier or network infrastructure provider from upgrading and improving its network ultimately harm citizens and enterprise customers, who miss out on more reliable, faster broadband service—as do municipal operations.

Municipalities need information that helps them understand that smaller, unobtrusive network infrastructure such as DAS and small cells carry traffic for fewer users and have different economics than macro sites. These technologies are designed to be deployed quickly, easily and less expensively. ROW access costs and associated fees must be correspondingly lower or such sites are not economically viable, leaving carriers and infrastructure providers with fewer deployment options.

Emerging Municipal Focus and Partnerships

There are currently no agreed-upon national models for making wireless deployments in the public ROW or municipal structures a mutually beneficial partnership for municipalities and wireless carriers and network infrastructure providers. Many cities are clearly focused on broadband policy, regulation and access to ROW and municipal infrastructure due to the ongoing convergence in telecommunications.

There are some promising examples of how such partnerships can work. In New York City, well-defined wireless policies, cost structures and franchise processes have facilitated commercial fiber and small-cell deployments. A new and innovative public-private partnership also is being closely watched for success: LinkNYC, which is a partnership between the City of New York and CityBridge, a consortium of leading technology companies and experts. LinkNYC plans to repurpose more than 7,500 obsolete pay phones into new structures called Links, which provide fast, free public Wi-Fi; free domestic and 911 phone calls; device charging; and a built-in tablet for Internet browsing and access to city services information; plus two large screens for public service announcements and advertising. This service, currently in beta stage, provides an advertising platform that is expected to bring more than $500 million in revenue for NYC. The project is also expected to create 100 to 150 new full-time jobs in manufacturing, technology and advertising.[9]

In San Jose, Calif., the City of San Jose has developed a Demonstration Partnership Policy, which was established to support its Economic Development Strategy and city operations. Under this policy, a SmartPole pilot project for wireless infrastructure is being deployed: Philips has deployed 50 SmartPoles, with energy-efficient, wireless-controlled LED lighting, which should provide the city with a 50-percent energy savings compared to conventional streetlights. They also offer built-in 4G LTE small cells. This enhanced coverage serves both the citizens of San Jose as well as provides capacity for IoT applications that the city may choose to implement. Philips also collaborated with local utility company PG&E to design a two-way communicating meter that sits on top of the SmartPole, rather than requiring the typical pedestal meter on the ground, thereby reducing street clutter.

AT&T and Alphabet (Google's parent company) chose locations for ultra-high-speed gigabit fiber deployments based on ease of deployment. These providers have selected markets such as Kansas City, Kansas, and Austin, Texas, due to their business-friendly and infrastructure-friendly environments.[10] Kansas City officials provided access to public ROW and expedited the permitting process, as well as offered space in city facilities and assistance with marketing in order to encourage Google Fiber to bring ultra-fast Internet connectivity to the area at an affordable price. Notably, when Google Fiber enters a market, it often spurs existing Internet providers to upgrade their networks. However, even the Kansas City deployment was impacted by out-of-date regulations on hanging fiber strands from utility poles, which delayed the new competitor's market entrance.

Some municipalities are nevertheless treating wireless access to the ROW as something to be concerned with, harkening back to the early development of macrocellular networks with overtly regulatory approaches. In some cases, municipal consultants and others also are using the demand for wireless access to the ROW as an opportunity to develop revenue-based models that have little or no relation to past policies related to communications uses or to the benefits to consumers. These actions threaten the ability to develop robust wireless networks now and in the future as 5G, Wi-Fi and other technologies evolve. In that context, this report seeks to identify some practices that can form a starting point for a wider discussion among industry and municipal officials.

Municipal Policies that may Encourage Broadband Investment

As the result of informal polling and surveys, several municipal practices were identified that may encourage broadband network investment by the private sector. These include:

- Treating companies that obtain State Public Utility Commission certification the same as other telecommunications providers and utilities, e.g., requiring an electrical permit only for placing wireless equipment on existing utility poles, provided that the applicant obtains attachment rights with the pole owner in accordance with other federal and state regulations.

- Development of city-wide master agreements for access to public ROW for fiber and/or pole attachments with fee provisions related to municipal cost of management of ROW as the economic model (as compared with revenue-generation models in those states that do not prohibit municipal charges). Baltimore, Md., for example, charges an annual fee of $100 per year for access to all city rights-of-way.

- Comprehensive master agreements for access to the ROW and attachment to city-owned infrastructure, including street lights and traffic signal poles with low-cost fees acknowledging the greater community interests and indirect economic development benefits. Such agreements must offer access to many municipal locations with expedited permitting on a large scale rather than processing each site request individually. This supports economies of scale by allowing uniform attachment of an approved form factor and reduces the workload for city employees tasked with overseeing the permitting process. Examples include the City of Boston, which charges a base ROW fee and a per-node fee for pole attachments; and White Plains, N.Y., which has a fee system based on access, not revenue, and charges a per-year, per-pole fee for attachments to city-owned infrastructure with approved options for small cells. Master access agreements are being successfully used in Boston, New York, Baltimore and several other cities.

- Revisiting and overhauling existing regulations, policies and procedures on pole attachment, ROW access and permitting so that expediency and new technologies such as small cells are taken into account—particularly in smaller cities and larger suburban towns and counties.

- When appropriate, approaching municipal projects with a "dig once" policy where public works projects include inexpensive conduit as part of any project where streets are opened up. This single action incentivizes telecommunications companies to lay more fiber because most of the cost of such projects is associated with labor to open up and later close the road surface. If conduit is already laid, this can reduce project costs by 90 percent or more.[11] Digging once also minimizes disruption to transportation and the local businesses and residents along such routes.

- Consider street furniture a potential mobile broadband resource. Light poles at the end of their useful life can be replaced with structures that can support or integrate small cells and DAS. When transportation shelters and other street furniture are placed or upgraded, these deployments can be approached with their potential as an infrastructure resource in mind. Even public waste receptacles potentially can serve as small-cell sites to provide better network coverage for citizens.

Conclusion

Mobile broadband infrastructure is increasingly vital to consumers, businesses and municipalities across the country as usage increases and more people rely on mobile-first or mobile-only telecommunications. Congested networks need to be upgraded and densified for wireless carriers and infrastructure providers to bring a better user experience through more coverage and capacity. To achieve better networks, carriers and infrastructure providers need clear and common-sense regulations and predictable timetables so they can bring new services to market economically. To benefit from the economic advantages of broadband, jurisdictions should adopt consistent regulations that foster innovation from the private sector and avoid regulations that discourage investment dollars from flowing to their communities. Municipalities have a responsibility to manage their ROW as a resource to benefit their citizens while balancing issues of construction safety and aesthetics, and also fostering fair access and market competition. Local jurisdictions can accomplish this goal by adopting policies and practices that enable a mutually beneficial, mobile infrastructure-friendly environment.

Appendix: Frequently Asked Questions from Municipalities

1. What is the role of DAS and small cells in the larger "mobile" ecosystem that includes both licensed and unlicensed spectrum, wireless service providers, Wi-Fi technology, the oncoming Internet of Things, public safety, etc.?

2. Why do licensed wireless carriers need access to municipal ROW for reliable service?

3. How do municipalities benefit from access to reliable wireless service?

4. What infrastructure options are available for these technology deployments?

5. As a policy matter, why should municipalities care about for-profit (commercial) companies deploying infrastructure with regard to their constituents, public safety and economic development?

6. Why do municipalities have a responsibility to manage the ROW and provide access on reasonable terms and conditions with clear policy?

7. What are some examples that other municipalities have used for collaboration with the private sector on process and also on cost?

8. Are there municipal/industry agreed-on models for costs that differentiate on economics and can be applied across the U.S., regardless of municipal size for ROW access or street furniture deployments?

9. What is industry doing to educate its own members about the appropriate part municipalities play in use of the ROW and ensuring safety?

Author Information

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Christopher B. Fisher is a partner at Cuddy & Feder LLP, a New York-based law firm where he chairs the firm's Telecommunications Practice Group and is past chairman of the firm's Land Use, Zoning and Development Practice Group. Chris provides wireless operators, tower companies, DAS and small cell providers with real estate, government relations, zoning, environmental, litigation and other legal services. He has been recognized as a Super Lawyer in Communications Law for the New York Metropolitan area annually since 2013.

Chris is also a founding board member and has served as President of the New York State Wireless Association since 2012. Under Chris' leadership, NYSWA established its Wireless Forum Conferences in NYC, published a statewide wireless economic impact report, expanded its advocacy with state leaders in Albany and has otherwise provided new and improved opportunities for NYSWA members to do business in New York.

Chris further contributes to the wireless industry nationally as a member of the Wireless Infrastructure Industry's Innovation &Technology Council and HetNet Forum, where he focuses his efforts on mobile infrastructure deployment. For over 20 years, Chris has been a tireless advocate for the wireless industry as an attorney, writer, speaker and in various leadership roles at the national, state and local level. www.cuddyfeder.com; www.nyswa.org.

Bryan Darr, Mosaik

Bryan Darr, founder of Mosaik, serves as President and CEO. Darr manages the company's growth as the market leader in providing telecommunications business intelligence information, in-depth coverage patterns and interactive mapping solutions to companies worldwide.

Bryan has spent most of his professional life in the wireless industry, beginning his career as a sales representative for Cellular One of Memphis in 1985. After discovering his customers were having difficulty traveling with their phones, he founded Mosaik Solutions (originally American Roamer) in 1988 and began developing consumer roaming guides. These products soon proved invaluable for carriers and wireless consumers throughout North America. As the industry has evolved, he has leveraged technology to drive innovation helping clients visualize data to better understand their customers' experiences and network availability as well as improve decision making on infrastructure expansion and densification.

Bryan was born and raised in Chattanooga, Tennessee, and moved to Memphis in 1980 to attend Rhodes College where he majored in International Studies. Bryan currently serves on the Wireless Infrastructure Association Innovation & Technology Council and the CCA Event and Associate Member Committees.

Michael A. Hill, ExteNet Systems, Inc.

Michael Hill is National Director for External Relations – Infrastructure at ExteNet Systems Inc. He is responsible for securing all agreements necessary for the successful deployment of ExteNet's wireless networks nationwide. Michael and his team secure right-of-way agreements with municipalities and other agencies, pole-attachment agreements with utilities and other pole owners, easement agreements for access to private property, and related entitlement agreements. Michael is also responsible for addressing any issues regarding federal and state laws and regulations affecting the deployment and operation of ExteNet's networks, monitoring any changes in those laws or regulations, and advocating on ExteNet's behalf when appropriate. Prior to joining ExteNet, Michael worked for American Tower Corporation in a similar capacity and the Thompson Coburn law firm, where his practice concentrated on real estate, zoning, and telecommunications law. Michael holds a B.A. in history from The Johns Hopkins University and a J.D. from Chicago-Kent College of Law.

Tamara Slade, ExteNet Systems

As the Northeast Director, External Relations – Municipal, Tamara is responsible for securing rights and entitlements and fulfilling other jurisdictional requirements necessary for ExteNet to deploy networks for its wireless service providers. Tamara has more than nine years of experience in the wireless industry. Prior to joining ExteNet, Tamara worked for American Tower Corporation and Network Building and Consulting, LLC on numerous projects with a primary focus on outdoor distributed networks. Tamara holds a B. A. in Political Science from North Carolina A&T State University and obtained her Juris Doctorate from Regent University.

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