BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C.

STREAMLINING DEPLOYMENT OF SMALL CELL INFRASTRUCTURE BY IMPROVING WIRELESS FACILITIES SITING POLICIES; MOBILITIE, LLC PETITION FOR DECLARATORY RULING	))))))))	WT Docket No. 16-421

REPORT AND DECLARATION OF ANDREW AFFLERBACH FOR THE SMART COMMUNITIES SITING COALITION

Contents

1. Summary

This document describes small cell and DAS wireless deployments, discusses local permitting and oversight process, and suggests strategies to maximize public-private collaboration to facilitate mobile wireless construction. As I explain below, "small cell" refers to the wireless antennas' coverage areas, not the size of the antennas themselves; because of the large scale of some small cell deployments, the installed equipment may approach the scale of typical macrocells.

The observations in this report are based on my experience over two decades of observing and overseeing build-out of communications infrastructure across the United States and abroad.[1]

Accommodating permitting and other local government requirements in public rights-of-way is typically a relatively small part of the cost and time required for design and construction of outside plant for a communications network. In my experience, the fees charged by local governments in connection with broadband represent a small portion of the cost of wireless network deployment, and the process entailed in local oversight of wireless facilities siting represents a very modest portion of the process and timeline of building or upgrading a wireless network, assuming that the wireless company participates in the process.

Local permitting processes and fees have little impact on the decision to deploy broadband in urban versus rural areas. In fact, the permitting process and local government coordination can help and facilitate deployment. When it is done effectively, it protects the integrity of existing infrastructure and public safety, and provides certainty and predictability to wireless carriers and wireless infrastructure companies.

In my experience, the optimal way to facilitate and smooth the wireless siting process is for wireless companies to work with localities by filing complete, accurate, timely siting applications—and by collaborating with the localities in an efficient, mutually-beneficial process of pre-planning, specification development, and reasonable staging of the deployment.

Localities are highly motivated to facilitate and incentivize broadband build-out, and are willing to use permitting and other processes to enable and smooth the deployment process as much as possible. Numerous localities are currently involved in creative efforts to understand private sector needs and to develop ways to work collaboratively. The next generation of wireless broadband deployment can best be achieved if wireless companies undertake a similarly collaborative, constructive engagement with localities.

[1] CTC provides technology engineering and business planning consulting services for public sector and non-profit clients nationwide and abroad. Since 1983, CTC has assisted hundreds of public and non-profit entities to analyze technology needs and strategies; plan and design wired and wireless broadband networks; and work with the private sector to meet local broadband and technology needs.

2. Small cell and DAS facilities in the PROW are neither small nor insignificant in impact

The term "small cell" is used loosely within the industry to refer to a wide variety of installations that are designed to serve a smaller area than traditional "macrocells." A search of literature suggests that there is no agreed-upon definition that could easily distinguish "small cells" from "macrocells" other than that loose distinction. For purposes of this report, we will treat any radio unit designed to serve a relatively small area as a "small cell" or "small cell and DAS" regardless of its technical configuration. What is critical to this proceeding is that the classification of something as a "small cell" does not mean that the impacts and complexities associated with its installation and maintenance are small.

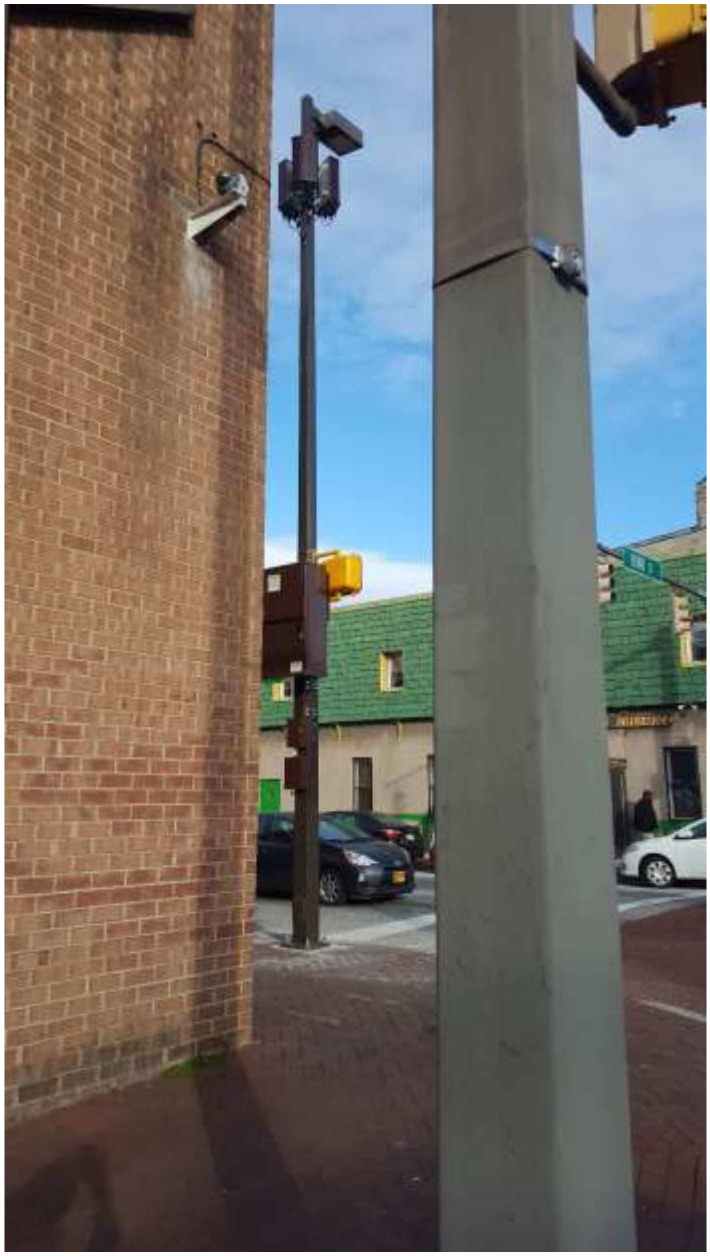
"Small" cell facilities can have significant profiles, including many components additive to the "small" cell antenna.

Over the past decade, service providers have begun to augment tall tower deployment with neighborhood wireless transmission facilities—such as DAS and small cells—that have smaller coverage footprints. In the new distributed wireless architecture, broadband users communicate with localized access points, typically mounted at elevations of 20 to 30 feet above ground level. These neighborhood access sites target service areas with a radius of 250 to 300 feet from the access site.

Small cell technologies vary in size and profile, depending on the functionality they are designed to provide.

A smaller antenna may be used to enhance mobile data capacity in an area that is already mostly served by a macrocell. At the small end is a system for a single band, using fiber optic connectivity to connect to the network. In this case the system might comprise a set of three panel antennas, each approximately 2 foot by 1 foot, attached 20 feet high on an existing light pole.

Figure 1 – Smaller Small Cell Pole with Fiber Optic Backhaul Connectivity



It would be accompanied by an electronics and power cabinet approximately 4 foot by 3 foot mounted between 8 and 12 feet off the ground, and by a power meter and load center five feet off the ground and by electric conduit up the entire length of the pole.

Because of the weight and wind loading of all the new attachments, existing light poles might not support them, and therefore placement of the small cell infrastructure often requires replacing the pole.

A larger system may be proposed in some cases. One reason may be that, instead of augmenting an existing macrocell network, a cluster of small cells or a multifrequency distributed antenna system (DAS) is being used in lieu of the macrocell, potentially because the terrain or aesthetics do not allow for a macrocell nearby. In this case, a provider will want a larger system that carries more spectrum bands. In a larger system that is being deployed instead of a macrocell, there may be a separate building, comparable to the hub building of a macro cell site (typically 25 feet by 50 feet), that manages and operates the cluster of DAS or small cell antennas. The system may require replacement of existing light or utility poles with taller ones, to enable the antennas to be mounted between 40 and 60 feet high. Antennas may be a combination of 2 foot by 1 foot panel antennas and 5 feet long whip antennas. Each pole may require multiple cabinets for the electronics, each approximately 3 foot by 2 feet. The cabinets may fill the entire area at the lower part of the pole. There is also significant cabling.

Figure 2 – Multifrequency DAS Structure with Multiple DAS Antennas

Figure 3– Multifrequency DAS Structure with Multiple DAS Antennas

Figure 4 – Base of DAS Installation With Multiple Cabinets for Radios, Backhaul, and Power

In addition to the physical components shown in these pictures, many "small cell" installations require a wireline connection to a central hub, and may also involve back-up power supplies, which may often be placed in ground cabinets of fairly significant size.

2.1 Some "small" cell facilities approach "macro" site facilities and electric transmission monopoles in size and weight

Because of the large scale of some "small" cell deployments, the deployments may approach the scale of typical macrocells.

In some small cell deployments, the technology does not use fiber or wired infrastructure to connect to the network. The network connectivity, known as "backhaul," is done wirelessly. In order for backhaul to work effectively using a wireless approach, there needs to be a strong signal between the small cell devices and one or more master backhaul antennas. Some providers are accomplishing this by making the master backhaul antenna especially tall, potentially 70 to 120 feet, which exceeds the height of many macrocells. Mobilitie is one company that uses this architecture and has filed many applications for poles of great height.

The figures below provide examples of exceptionally tall "small" cell deployments in the rights-of-way, including one with the radios placed above high voltage transmission lines. The only visual difference from a macro cell monopole, which is frequently of this height and placement, is the relatively skinnier antenna profile at the top.

Figure 5 – Small Cell Comparable in Height to Macrocell

Figure 6—Small Cell at Height of High Voltage Transmission Lines

2.2 Alternative technologies have smaller form factors

The photographs above reflect the equipment required for particular deployments by particular providers of wireless services or facilities used in the provision of wireless services. The facilities are primarily designed to make more efficient use of commercial cellular wireless spectrum and are designed to provide those services to commercial wireless users. There are, however, design alternatives that could serve the same ends, without the large form factors shown on some of the photographs. That is, to some degree, many of the same functions could be performed using different and potentially less intrusive technologies.

There are also other wireless technologies under development and deployment that have a smaller form factor and lighter equipment. For example, wireless equipment using very high frequencies in the submillimeter spectrum, also known as mmWave, is envisioned as part of the emerging 5G architecture. mmWave equipment typically uses spectrum above 10 GHz and uses much larger channels than the commercial wireless providers. This provides potentially much higher speeds. Examples of mmWave equipment are shown in the figures below. The white devices are mmWave equipment, and these provide intermediate connectivity to the Wi-Fi equipment (black panel antennas). The devices are relatively small, some measuring 12 by 6 inches and weighing a few pounds.

While mmWave equipment is not a full replacement for commercial cellular technology,[2] it may provide an alternative solution for parts of the cellular architecture, such as the backhaul network connection, and indicates that future generations of wireless equipment might not be as large and heavy as the current generation of small cells. For example, if it operates as a backhaul technology that connects a network to cellular or Wi-Fi equipment on a pole, it can be a lighter-weight and smaller profile alternative to the types of backhaul technologies that require 90- to 120-foot poles.

[2] mmWave does not support mobile use in its current form. It requires line of sight or near line of sight connections, mmWave user equipment is not yet mass produced at low prices. However, it can be part of a comprehensive wireless solution that does support mobile use.

Figure 7 – mmWave Antennas Providing Backhaul for Wi-Fi Network

Photo courtesy of Siklu Communications

Figure 8 – mmWave Antennas Providing Backhaul for Wi-Fi Network

Photo courtesy of Siklu Communications

Cable operators are also deploying Wi-Fi equipment in the rights-of-way, leveraging their cable attachments on utility poles and devices installed on customer premises. Like the mmWave equipment, the Wi-Fi equipment is smaller and lighter than the cellular small cells. It is powered through the cable system and does not require additional cabinets on the poles. Wi-Fi and future generations of unlicensed technology may be deployed on utility poles and customer premises and may also provide an alternate technology solution for the densification challenge that are currently being addressed by the small cells.

The sorts of deployments proposed by companies like Mobilitie are thus not necessarily critical to ubiquitous broadband, and local efforts to minimize impacts can be entirely consistent with rapid and efficient wireline and wireless deployment.

Figure 9 – Wi-Fi Antenna on Cable TV Attachment

3 Local review protects public safety and critical infrastructure

The recent round of wireless applications, including for the types of tall poles described above in residential neighborhoods, historic districts, or in areas where citizens have spent significant resources on redevelopment, has drawn the attention of the public itself—with large turnouts in public meetings, organized movements, and media stories. As a result, the review processes become more time consuming, but not without good reason. In fact, the review of applications for placement of small cells in the rights-of-way may be far more complex than the review of an application for placement on private land, a rooftop, or the side of a building.

A typical community reviewing an application for use of the rights-of-way considers:

- Effect on public safety communications
- Effect on public safety, including potential impact on pedestrians and vehicles; the likelihood that the object will be hit; and the possibility it will contribute to an accident, for example by blocking a view
- Effect on other public infrastructure, including, for example, storm water systems

- Effect on residents, neighbors, business owners, and customers
- Effect on ADA compliance and on members of the community with disabilities
- Congestion on sidewalk or roadway
- Aesthetics, including the compatibility with the surroundings, blockage of view
- Setback, including the risk of damage or injury if the object falls

These reviews, and the ongoing use of the wireless infrastructure are complicated by the fact that rights-of-way are constantly changing. Aboveground facilities may be moved underground pursuant to a development plan or in response to hazards created by the placement of structures. Sidewalks and roadways may need to be widened, or hazard-free-paths created for pedestrians or cyclists. The addition of occupants to the rights-of-way necessarily complicates the process of coordinating right-of-way uses.

3.1 Local review protects against interference with public safety communications

Applications that are in proximity to public safety communications antennas or collocated on the public safety antenna sites require extra scrutiny for interference. Usually this due diligence is performed by the applicant as a condition of use of those structures, but it requires additional review by the public safety communications staff. The siting review process is a way of ensuring that applications that may pose risk to public safety communications come to the attention of the public safety communication staff, and that the applicant has demonstrated it will not interfere.

3.2 Local review protects public safety and utility worker safety

A well-organized siting review process can systematically evaluate the risks to public safety and utility worker safety. By requiring a complete application, the process requires the applicant to do its homework and conduct all engineering and design in advance, and perform all the necessary evaluation of compliance with local code, land use and transportation corridor rules.

In the review process, a community can identify the clearances between the structure and the road and buildings. It can verify the RF emission and its compliance with FCC rules regarding emissions and signage. It can verify the placement of power meters and power shutoff. It can verify that structural engineering has been performed. It can verify that soil studies and drainage studies have been properly performed, both of which are critically important for structures on the scale of the new poles, especially the tallest, which are nearly four feet in diameter at the base. It can verify that the applicant has coordinated with the existing utilities. It can verify that landowners and community groups will be notified and where appropriate, provide their consent.

Cabinets at ground level or on poles can block traffic or obstruct views. The review process can verify if the placement will have an impact on traffic or the view in a way that can impact public safety or increase the likelihood of accidents. It can verify compliance with safety clear zones. It can verify compliance with DOT rules that allocate different spaces in the rights-of-way to different uses, or ensure that the DOT has an opportunity to perform the review.

3.3 Local review protects critical public infrastructure

One of the main purposes of the rights-of-way is the storm drainage from the road. The review process can verify that the design is in compliance with rules on drainage. Similarly, the review can verify that the design for the structure will not create problems for snow removal.

Placement cannot interfere with potential road widenings. A new structure needs to be placed so as not to interfere with known or potential road widenings, and there needs to be a procedure in place if road widening needs to happen—such as one in which the applicant moves or dismantles the structure.

3.4 Local review allows consideration of impact on ADA compliance

Communities are making large investments in ADA compliance in the rights-of-way. Examples include the placement of ramps at intersections, audio at crossing lights, and sufficient space on sidewalks for wheelchairs. A review process can ensure that a proposed structure is compliant with community rules about the sidewalks and does not reverse these efforts or make them more difficult to implement. Not only the pole needs to be compliant, but cabinets need to be placed such that they do not obstruct. The process also needs to take into account future modifications that may take place on the poles. Since many of these may be done by right, the initial review needs to take into account sufficient margin to accommodate modifications without becoming a risk to people with disabilities.

3.5 Current FCC rules for "minor" modifications increase risk regarding issues such as public safety by creating technical incentives to deploy in inefficient ways

The importance of review of these areas related to safety, ADA compliance, and existing utilities is compounded by the FCC's existing rules that allow certain increases in size of facilities by right. Indeed, permissive rules for expansion of existing wireless facilities as currently applied to facilities in the rights-of-way actually create more problems than they resolve because they allow for small form factors to be replaced by large form factors.

As a result, a proposed installation that is acceptable as initially installed could create public safety challenges at a future date. And the potential for growth discourages more efficient designs and technology choices that can deliver the same coverage and functionality without the size and complications of Mobilitie-type deployments.

In these ways, the FCC's current modification rules are incenting design inefficiency by the companies and are greatly complicating the local review process.

4 Small cell infrastructure may not enable 5G and IoT deployment

There is no 5G standard—at the moment, 5G is envisioned as a means to providing the next generations of mobile broadband applications, especially low-latency communications for machine-to-machine communications and the Internet of Things (IoT).[3] Researchers and industry experts differ on the extent to which this future will be an evolution of LTE and licensed frequencies, the use of mmWave technologies, and the use of unlicensed technologies using small radios at short range—or the degree to which 5G will be ubiquitous or simply for high-traffic corridors and specific applications. And there is no way of knowing, at this point, whether traditional licensed frequencies provide the best option for IoT or whether the IoT is more likely to depend on low-powered unlicensed wireless networks that can use networks of small sensors connected to a fiber backbone to provide real time information. And we do not know how the communications networks will function with are be integrated with wireless charging networks now being tested in the U.S. and elsewhere.

From an engineering standpoint, it may be that the things that companies like Mobilitie want now (large, 120-foot towers) do not provide the best model for the future, and that limited rights-of-way real estate is better dedicated to smaller profile, embedded devices that work in conjunction with fiber and larger wireless networks.

In other words, it is not necessary to clear the path for placement of small cells of any size and form for 5G or IoT – if anything, putting a thumb on the scale favoring Mobilitie's 120-foot deployments may simply interfere with creation of more efficient networks. The Commission's own struggles with LTE-U suggest why not every deployment is necessarily a deployment that will advance 5G or IoT.

5 It is more time-consuming to evaluate applications for facilities in the PROW than on private property

Given the potential impact on safety, the scarcity of space, and the competing needs for the rights-of-way, the review process in the rights-of-way needs to be very extensive. By contrast, on private property, the review process is more limited—does the structure fit into the surroundings, is it safe, have the right people been notified and approved? There is often no need to worry about traffic, drainage, ADA compliance, or existing utilities—or those issues may be more easily addressed.

[3] Wirelessly interconnecting electronic devices and machines over the internet.

5.1 Private property offers a workable alternative to rights-of-way for siting small cells and DAS

The public rights-of-way are not the only way "small cell" systems can be built. From a technical standpoint, the network can frequently be designed for similar coverage using private rather than public property. As an example, Mobilitie is requesting approval for a 75-foot structure in a crowded downtown area in suburban Washington, D.C. The proposed structure and its height are indicated by the red arrow. Near the proposed structure are several buildings where the rooftop and façade could be used. There are already macrocell antennas on two nearby rooftops, so clearly backhaul and power are readily available. Using those structures could eliminate the need for the new 75-foot structure. **The only advantage of using the rights-of-way is for Mobilitie to avoid paying rent to the building owners—but this "savings" comes at the expense of the public through the added risk, congestion, and disruption of placing a very large pole in a very busy sidewalk, very close to the road and buildings.**

Figure 10 – Site of Mobilitie Application for New 75-Foot Pole

6 Reducing local fees or processes will have marginal impact on rural broadband deployment

It is deeply misleading to suggest that "streamlining" processes for reviewing small cell deployments will lead to increased build-out in rural areas—because such processes and fees are limited or non-existent in those areas already, and the technology is not well-suited to rural areas.

6.1 Small cell and DAS are typically not deployed in rural areas because the technology is not suited to rural needs

Small cell technologies are best suited to add capacity to mobile wireless networks in areas that are congested and where demand for bandwidth outpaces supply, or where macro cell sites are not suitable for aesthetic or functional reasons.

Small cell networks are designed to maximize the use of spectrum by efficiently reusing the spectrum in many smaller coverage areas rather than across fewer, larger coverage areas (as macro cell sites do). That is, these networks are typically not being used to expand the area covered by existing macrocells; rather, they add capacity in existing coverage areas, or fill in spotty coverage gaps in very targeted areas within a carrier's current coverage area such as, for example, in valleys where the terrain blocks coverage from a macro cell.

For these reasons, these technologies are best suited for urban and suburban markets with high concentrations of users in relatively small areas, and for very limited deployment in high-value rural areas, such as alongside major roads in rugged terrain. They are not intended for most rural or low-density markets where density of users is lower and where fewer, larger macro sites are far more cost effective to deliver service than frequent micro sites.

The following photo illustrates a deployment of DAS in rural areas. This DAS is located alongside U.S. Route 6 in Clear Creek County, Colorado, where a macro site is not possible because of the terrain and the macro sites in the mountains above cannot provide coverage in the narrow canyon below.

Figure 11 – Distributed Antenna Installation on U.S. Route 6 in Clear Creek County, Colorado

6.2 Local process and charges have marginal impact on rural broadband deployment patterns

Based on my experience observing broadband investment patterns since the advent of the wireless and cable platforms in the late 1970s, nationally mandated changes to permitting fees, franchise or license fees, or fees for leasing public property or structures, or changes to local oversight of wireless siting are unlikely to change the return on investment calculus in a way that would result in advanced wireless services being deployed in rural or other underserved areas.

The fundamental dynamic of broadband investment is that network deployments and upgrades are capital-intensive—and capital flows to areas where projected returns are greatest because demand is most concentrated and per customer costs lowest. Shortening the Section 332(c)(7) review times, setting up a national regulatory system to review fees, or nationally regulating rents for use of public property would not change that fundamental dynamic. At best, national standards would mean industry costs would be reduced in rural and urban areas; such standards would not make it more likely that build-out would occur in those areas. In fact, it is my observation that carrier deployment investment decisions are made centrally and the companies' local representatives compete for investment allocations.

As a result, even where the economics of rural build-out could be marginally improved (through elimination or reduction of a cost of doing business), investment patterns do not change because the fundamental economics do not change. In decades of experience, we have never observed a build-out scenario where reduced marginal costs (such as local fees or public process) resulted in funds that were allocated for build-out in more populous areas being diverted to a rural or underserved area.

Indeed, in most rural communities, local permitting processes and fees do not exist. It is in the most unserved and underserved rural areas where local fees and process are most minimal or non-existent, either because the locality does not see a need for them (for example, traffic control in these areas requires less coordination) or because as a matter of local or state policy, there exists little or no process or fee for permitting communications infrastructure.

In recent years, we have on numerous occasions worked with local government clients to approach carriers to request enhanced build-out and to inquire as to how the locality can facilitate and enable (or even subsidize) such build-out. But even where localities commit to eliminating regulation and fees, we have not seen carriers commit to new investment for which they did not otherwise have existing plans for a business case.

7 Localities exert themselves to attract and facilitate private investment in new or upgraded broadband facilities, including in wireless

Even though the effort does not always bear fruit, local governments are highly motivated to facilitate broadband deployment and attract broadband investment, both in wireline and wireless service. Over the past decade, we have observed countless communities seeking to build processes and incentives for private investment in broadband, and to simultaneously facilitate and smooth the way for private deployers.

We have observed this dynamic in both the wired and wireless areas. With regard to wireline broadband, for example, more than 1,100 cities and counties filed initial requests in response to Google's call to communities to compete for new broadband investment—and Google has been inundated by request and proposals from hundreds more communities in the years since. And those communities that Google Fiber selected for potential deployment undertook multi-year efforts to organize, streamline, facilitate, and enable Google's deployments,[4] even without any assurance that Google would eventually commit to building in their city.

Those and other cities also undertook similar efforts to recruit other companies, both incumbents (particularly AT&T and CenturyLink, who also availed themselves of public facilitation in response to the Google Fiber competitive threat[5]) and competitors (including a new class of smaller

[4] Derek Slater, Google Fiber Blog, "Behind the scenes with Google Fiber: Working with city governments," October 7, 2013, https://fiber.googleblog.com/2013/10/behind-scenes-with-google-fiber-working.html.

[5] In the research triangle area of North Carolina, for example, AT&T was granted significant process concessions and reduced fees by a consortium of cities working with local universities to encourage and facilitate broadband

wireline and fixed wireless ISPs that have emerged in the past few years with capital to build new networks in select cities).[6]

In the wireless area, both metro-area and rural communities work to fulfill public demands for better mobile connectivity—sometimes to no avail if the wireless industry does not prioritize the unserved or underserved areas.

We have observed considerable public sector effort to understand and address private sector investment imperatives in mobile wireless, and numerous county and town efforts to recruit mobile companies to improve services in underserved areas. In some cases, public enticements to the industry will begin with meetings and requests but can extend as far as offers to contribute assets, pay for deployment, or subsidize operations.

Summit County, Colorado, for example, offers a good example of how communities seek to facilitate private deployment. The County last year released an RFI "to convey its interest in partnering with a motivated, high-caliber partner to make wireless broadband service available in three underserved areas of Summit County over privately or publicly-constructed infrastructure."[7] The County is working energetically to create opportunity and incentive for wireless carriers to deploy in these rural areas, and has offered access to public assets as well as the potential for public contributions of capital to support the private deployment.[8]

A national set of rules that effectively forces local and state resources to be expended to comply with those rules will at best handicap such efforts, in our view.

7.1 Delays in review of applications are frequently created by insufficient or inaccurate applications by carriers

In many cases, delays in processing requests for placement submitted to localities are caused by the applicant's submission of incomplete or unverified engineering information, and subsequent delays in responding to requests for additional information. In my company's experience, there exists a pattern with some applicants of consistently filing inaccurate or incomplete applications and then criticizing the locality for not approving these insufficient applications.

investment. North Carolina Next Generation Network (NCNGN) Blog, "NCNGN Selects AT&T," April 8, 2014, https://ncngn.org/.

[6] In Holly Springs, NC, for example, the Town leased fiber, streamlined permitting, and facilitated entry and construction by competitor Ting Internet. Ting Internet Blog, "Interview with Jeff Wilson, IT Director of Holly Springs" January 26, 2017, https://ting.com/blog/internet/hollysprings/interview-jeff-wilson-director-holly-springs/.

[7] Request for Information for Partnership for Deployment of Wireless Broadband to Three Underserved Areas in Summit County, November 21, 2016, http://www.co.summit.co.us/DocumentCenter/View/16781?bidId=169.

[8] Ibid., page 13.

For all of the public safety, public infrastructure, and ADA compliance reasons described above, localities cannot approve erroneous or incomplete applications – nor would they want to create incentive for the applicants to continue filing insufficient applications.

In contrast, many companies consistently file adequate, complete, professionally prepared documents, which enables expeditious review and resolution of the applications—to the benefit of both public and private sectors.

Challenges can also be created by filing of hundreds of permits at one time, or an unwillingness of carriers to work with the locality to stage applications and mutually determine a schedule that works for both parties. In contrast, if the applicants work with the city or county to plan to stage the filing of permit applications rather than filing hundreds at one time, the processing burden on the locality is spread over a reasonable period of time. In my experience, localities are very willing to work with deployers to establish timetables and processes for reasonable submission—and reasonable review—of permit applications. In a cooperative process, the parties can define a logical construction area for which all necessary applications can be submitted, and a timetable for review that balances applicant needs and competing demands on the locality's staff. In some cases, to accommodate bulk review, the locality must hire additional or outside staff, and the applicant agrees to pay those additional costs. What works depends on the community and on the project.

It is worth emphasizing that submission of applications in bulk does not necessarily reduce the time required to review applications. A bulk submission does allow a locality to understand the overall impacts and design of a network, and that is helpful in understanding the goals of the applicant, and in considering alternatives. However, many elements of a review, discussed above, are site-specific, and the time required may depend on the resources required. In our view, attempting to regulate what is now a cooperative process would not be helpful. In our experience, bulk applications, if only because they do require coordination across many sites, require more time to review than individual applications, particularly individual applications for use of private land. However, in our experience localities have been able to address the bulk review process within the parameters of the FCC's Section 332(c)(7) shot clock through agreements with the operator.

8 The optimal way to enable broadband deployment is to encourage local public-private collaboration

In my experience, the most successful and speediest broadband deployments are those in which public and private entities work collaboratively and willingly.[9]

This collaborative local process is not only a successful strategy for enabling private investment, but is also an efficient means by which to ensure that communications networks are built in efficient, thoughtful ways through comprehensive planning.

Network deployment is likely to be fastest and most efficient if the private deployer will work with the public sector to plan adequately and comprehensively for design, permitting, and staging of construction—and if all private entities will collaborate with each other and the public sector to plan ahead in ways that will make construction more efficient for all.

8.1 Collaborative process facilitates and speeds deployment, while minimizing conflict, both in wireless and wireline

Comprehensive development planning, with frequent collaboration and input from both public and private sectors in the pre-construction phase allow private providers and localities to understand and coordinate each other's plans and timelines. For example, this kind of cooperative planning enables a willing provider to stage permit and inspection requests rather than filing for an overwhelming number of permits at one time. It also allows the provider to strategically plan where it will deploy infrastructure.

An additional benefit of this approach is transparency: both parties are incented to share information to maximize the pre-construction planning and minimize likely points of conflict. Indeed, the need for transparency and communication is mutual: much as the locality should be open about its processes, the private deployer should do the same and should plan and stage its construction to maximize cooperation with the locality.

For example, a comprehensive process was undertaken in 2014 between the City of San Antonio and Verizon Wireless to support Verizon's small cell efforts. Through a collaborative process between the two parties that addressed a city-wide plan and accommodations for historic sites, San Antonio and Verizon Wireless agreed on a master license agreement for use of City rights-of-way for the installation of small cell equipment on utility and traffic light poles.[10] The process

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[9] Speed of deployment, of course, also assumes that private sector processes such as make-ready on utility poles, proceed efficiently, and that private entities do not endeavor to slow down existing or potential competitors by obstructing such processes as make-ready. See, for example, Ibid.

[10] This agreement was adopted by the City Council by ordinance in June 2015. "Master License Agreement Between the City of San Antonio and San Antonio MTA, L.P. D/B/A Verizon Wireless for the Use of Public Rights-of-Way," June 2015, https://webapps.sanantonio.gov/filenetarchive/%7BCDFE105E-763B-4D83-BFC0-

enabled Verizon to plan ahead, with predictability and stability, for its small cell deployment, while simultaneously enabling the City to protect key public interests (such as public safety), critical historic sites (such as the Alamo and historic Missions), and the vibrant tourism economy that is based on those historic sites and the City's unique history.

8.2 Treating wireless deployment like a development plan encourages industry to work with localities and satisfy public concerns

Treating wireless deployment planning like development planning enables creation of a comprehensive infrastructure plan ahead of time so as to ensure adequate capacity and efficiency of construction—with reduced need for subsequent retrofits.

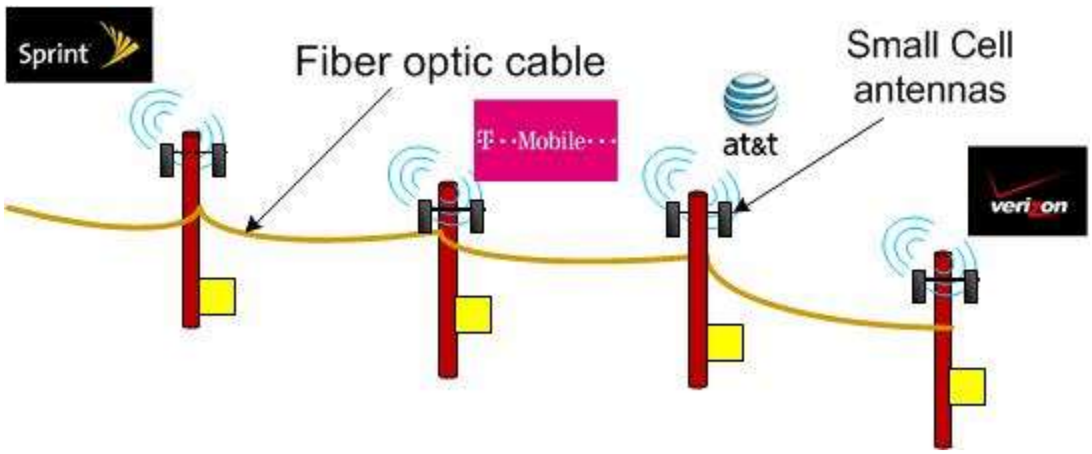
Broadband planning at the local level works best and most efficiently if it aligns with how communities plan for other forms of infrastructure: In new development areas, the community and utilities develop master plans to include all utility constructions in the appropriate locations and with the appropriate easements. This process ensures that there is sufficient space for all utilities and ensures that the utility companies are notified and given opportunity to place their infrastructure at the appropriate time, subject to the agreed-upon design criteria developed during the planning stage. And once the plan is in place, all parties agree not to deviate from it; all are obligated to meet the design parameters of the plan, which minimizes their costs and enables them the opportunity to participate.

Similarly, in the case of significant redesign projects (such as redesign of roads or sidewalks or water utilities), standard planning process requires all utilities to together to ensure coordinated, efficient planning and construction. This reduces the costs for all parties, and gives both public and private sectors certainty. So long as the wireless carriers are willing to work with the locality on such processes, they can benefit from this city-led effort to ensure that infrastructure is deployed efficiently and that the design works for as many of the companies as possible, at the same time as protecting the public interest.

For example, in one likely scenario (illustrated below), comprehensive planning creates mutually-beneficial design parameters that allocate poles to ensure all carriers have access to infrastructure. This effectively grants the carriers siting pre-approval and reduces process for carriers down the road so long as they comply with the design parameters.

2B4D11E4712A%7D/%7BCDFE105E-763B-4D83-BFC0-2B4D11E4712A%7D.pdf. Subsequent agreements have been developed with other entities, including Mobilitie.

Figure 12 – Illustration of Planned Allocation of Poles to Enable Deployment by Four Wireless Carriers



The following examples are illustrative of some of the other creative efforts underway at the local level to seek means of public-private collaboration. This list is by no means exhaustive; rather, hundreds of such processes are underway throughout the country in communities of all sizes.

The City of Seattle in February released a request for information (RFI) seeking private sector input and ideas regarding potential public-private collaboration for deployment of wireless infrastructure and services.[11] With one clear goal focused on enabling new access to broadband services by lower-income members of the community, the City's RFI seeks to "gauge the interest of for-profit and non-profit entities in forming collaborations or partnerships with the City to enable the deployment of wireless services in Seattle. The City is seeking ideas from the private sector with regard to ways that public and private sectors can work together, with the City as facilitator, enabler, and potential partner to the private sector, in deploying wireless network infrastructure to support key goals."

The RFI specifically invited "both competitors and incumbents of the communications industry" to respond, as well as "a wide range of non-traditional entities that may be interested" in wireless in Seattle."[12]

In the RFI, the City notes that it "seeks to utilize its assets, capabilities, and other attributes to enable deployment of new and cost-effective wireless services. Among other assets, the City may

[11]"Request for Information for Collaboration and/or Partnership between the City of Seattle and Private Sector Entities for Wireless Services and Potential Smart Cities Deployments, Including in Low-Income Districts, and Parks," February 2017, http://www.ctcnet.us/wp-content/uploads/2017/01/Seattle-Public-Wifi-RFI-FINAL.pdf.

[12] The request is specifically made to such potential respondents as companies involved in the emerging Smart Cities ecosystem, including solutions providers and manufacturers; companies involved in the emerging drone and aerial vehicle ecosystems; non-profit organizations; local businesses, including those in the technology sector; manufacturers of equipment, including of network equipment and of the physical housing and platforms for wireless services; nontraditional wireless providers (e.g., technology companies, technology integrators, software providers, and engineering companies); and investors. Ibid.

be able to make use of conduit, fiber, and wireless siting locations." The RFI invites responses that would help the City learn "more about what assets and contributions would facilitate the deployment of the provider's solution. Respondents should discuss permitting, rights-of-way, property usage, conduit access, fiber connections, electricity requirements, and any other required or beneficial contributions."

The City also offers that it "seeks to maximize its processes and structures to best enable and facilitate new and cost-effective wireless services. In keeping with Mayor Ed Murray's ongoing commitment to enable private deployment of broadband facilities, the City seeks to determine strategies by which to make itself as friendly as possible to private broadband investment."[13]

Similarly, the City of Fresno, California released a Request for Qualifications (RFQ) in 2016, seeking private interest in expansion of broadband, both wired and wireless, throughout the City.[14] The RFQ invited private entities to share their ideas about how public and private sectors could work together to expand broadband availability. In the RFQ, the City offers that it would work with the private sector to make available the City's extensive networks of light poles, towers, rooftops, structures, fiber optics, and conduit. The City also notes its streamlined permitting process and willingness to commit resources to facilitate private deployment.[15]

What is critical to these efforts is that the FCC rules are interpreted in a manner that permits localities to work with providers to pursue these solutions. It is, for example, much more difficult to come up with an acceptable development scheme if an acceptably designed facility in the right-of-way can be replaced by intrusive designs of the sort shown earlier in this report.

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 8, 2017.

Andrew Afflerbach, Ph.D., P.E.
Director of Engineering
Columbia Telecommunications Corporation

[13] Responses to the RFI are currently being reviewed by City staff.
[14] https://www.fresno.gov/informationservices/wp-content/uploads/sites/15/2016/10/WiFiRFQwithAppendices_FINAL.pdf
[15] Ibid., page 11. Responses to the RFQ were received in November 2016 and are currently under review.