

Plan On It

A Dutchess County Planning Federation eNewsletter



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Understanding the Rollout of 5G Wireless

By: Department Staff, Dutchess County Planning & Development

Though it may not seem possible, it really wasn't all that long ago that we accessed the internet on desktop computers, mostly for research purposes, using dial-up connections. Mobile phones were uncommon. In just 15-20 years, the rapid and increasing pace of technological advancement has completely reshaped how most Americans live, work and play. The internet is no longer just a powerful tool, but an integral part of our lives. From finding directions in real time, to staying entertained by streaming high-definition television shows and movies, to shopping and more, we rely on smartphones in almost everything we do. They're also connected to all of our other "smart" devices throughout our homes and businesses.

How rapidly has this sector grown? In 2011, [Pew Research found](#) that 83 percent of US adults owned a cellular telephone. Of those US adults, 48 percent owned a basic style phone, while 35 percent owned a multi-function smartphone. By 2019 those figures changed dramatically to a whopping 96 percent owning some type of cellular telephone — with 15 percent owning a basic style phone and 81 percent owning a smartphone. Roughly one in five American adults is a "smartphone only" internet user, which means that he or she owns a smartphone, but does not have traditional home broadband service. As a result, the availability of more "smart" devices on the market, and the demand for more mobile technologies and data, the existing 4G network is almost at capacity, and our demand for mobile data only continues to grow. Because of these demands, the next generation of wireless technology has to keep up with the rising demand for data.

Watching

What We're Reading

We created this segment to share interesting books, blogs and more to further spark your interest in the how's and why's of placemaking. We hope you find it inspiring!

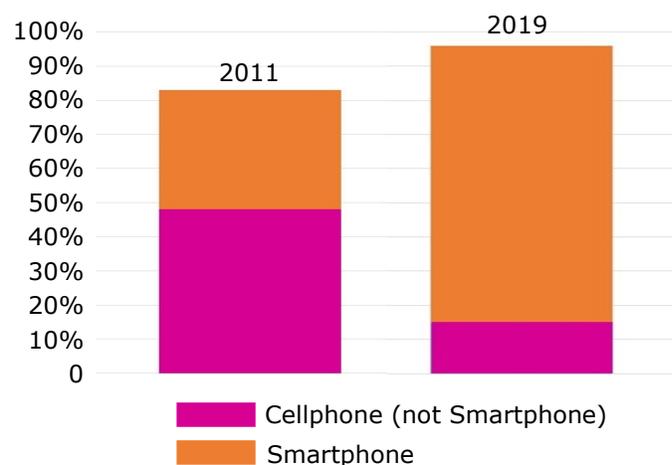
Staff WEBINAR SERIES REVIEW:

On the Park Bench:
A Public Square Conversation

Congress for the New Urbanism (CNU) launched its **On the Park Bench: A Public Square Conversation** webinar series to provide for discussion and debate on how the New Urbanism movement can respond to the unprecedented times brought on by COVID-19. Webinars are free and feature nationally-recognized experts. Previous topics run the gamut and include:

- [Housing Affordability & Access](#)
- [The Pandemic's Impact on Real Estate Development](#)
- [Virtual Public Engagement](#), and;
- [Equity-Driven Planning](#).

Visit [On the Park Bench](#) to register for upcoming webinars or watch recordings of previous sessions.



This data shows the shift from traditional, basic-style cell-phones to multi-function smartphones. (Data: Pew Research)

How We Got Here: A Brief Look Back at Mobile Generations

To begin, it's helpful to look back upon previous generations of wireless cellular technology. The first generation of wireless cellular technology, known as 1G, brought us the first cellular phones. This system, introduced to the United States in the early 1980s, used analog radio signals to transmit calls. Second-generation (2G) technology switched from analog to digital signals and enabled text messaging. Third-generation (3G) technology, introduced in 2003, allowed wireless phones to access the internet for the first time.

After the iPhone debuted in 2007 on 3G networks, the smartphone industry exploded, though "smartphones" combining the features of cell phones with Personal Digital Assistant (PDA) technology had existed since the early 1990's. Fourth-generation (4G) technology, the current generation of mobile technology, allows users to stream high-definition video, which uses more data and bandwidth. Our current 4G networks rely on large, macro-scale towers broadcasting wireless signals over a large area.

What's Different About 5G?

The fifth generation, at its most basic, is both a new broadcast spectrum and a new technology, relying on higher-frequency waves being transmitted over small cell antennae. It can handle 1,000 times more mobile traffic than existing 4G networks. Once 5G is fully developed, users will be able to download a full length, high-definition movie in mere seconds.

Because 5G will operate in the high-frequency spectrum between 30 GHz and 300 GHz, these waves will have extreme difficulty penetrating obstacles like buildings or trees, or traveling long distances. To be efficiently routed to their destinations, signals will travel through thousands of small cells. Instead of one large-scale cell tower broadcasting the signal over a large geographic area, these small cells will be placed throughout a municipality, forming a dense network for efficient and uninterrupted signal relay. This means that your device will receive the signal from many different small cells as you navigate through an area and around obstacles impeding the signal.



On the left, a new pole holding small cell equipment installed in the right-of-way in Albany, NY. On the right, an example of a small cell integrated into a municipal streetlight. (Photo Credits: Paula Gilbert (l), NYS DOS (r))

Small-cell technology is already in use in densely populated places to boost range and coverage, and also to increase the capacity of our existing 4G networks. These cells communicate with the larger network, but can only increase service in small geographic areas ranging from approximately 30 feet to 1.2 miles (whereas the larger macrocell towers provide service at ranges up to 20 miles). Since the 5G build-out will require so many small cells, telecommunications providers prefer to place these cells in municipally-owned rights-of-way (ROWs). This requires providers to submit applications for local government land use review, unless a municipality has entered into an agreement with a provider giving them access to certain structures in the ROW and only requiring building permits.

What Does 5G Mean for Local Governments?

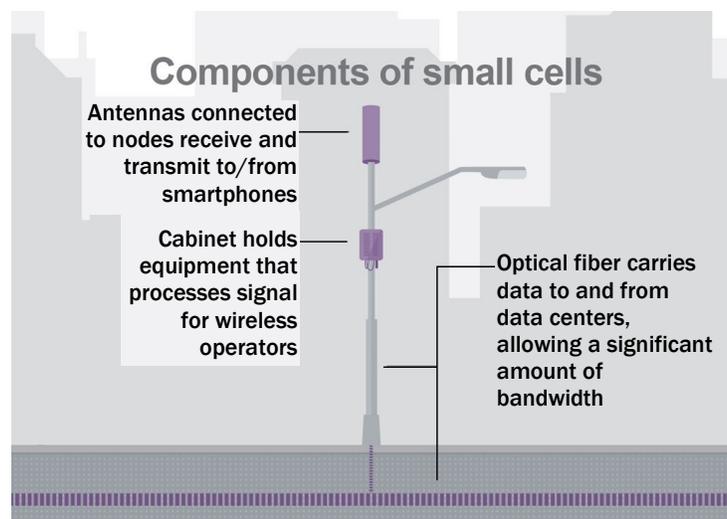
For local governments, 5G presents both challenges and opportunities. There has been an increased focus on efficiency in government and many municipalities are turning to technological solutions to work smarter. In some areas, 5G will play a role in “smart city” solutions to municipal challenges. For example, remote control of signals will allow traffic engineers to ease congestion in real time. Infrastructure elements, like water and sewer systems, will be connected to the internet, providing constant surveillance and faster response times when problems arise. First responders will be better-equipped to respond to emergencies with high-quality video feeds of the situation on the ground.

Local Regulation of 5G

Municipalities can regulate 5G facilities on both private and public properties, including the local, County and State street and highway rights-of-way (ROW). While regulating 5G installations on private property is more straightforward, most small cell nodes will likely be placed on existing utility poles, so it may be a good time for municipalities to examine their utility easements and ROWs to identify any ownership issues now. As zoning applies to both private and public properties, local regulations remain in force. A municipality should adopt regulations and standards into their zoning code regulating small cell wireless installations. Municipalities should be sure to notify all streetlight and utility pole owners as well as their county’s Department of Public Works and the NYS Department of Transportation to make them aware of these new regulations.

As nodes may be deployed on streetlight and utility infrastructure in the public ROW, municipal officials should start thinking more comprehensively about the poles and fixtures in these spaces. Can your lighting fixtures and utility poles handle a secondary function like a small cell? You may have 500 light fixtures scattered throughout your municipality, but can they all handle a secondary component safely? If only 250 can, do you have a way of inventorying those fixtures? A municipality that is prepared to provide these details will be more prepared to handle a 5G small cell application.

As for the specifics of new code language, pay particular attention to community character and historic districts to ensure that new facilities complement local character in an unobtrusive way. For municipalities with buried utilities or



This graphic illustrates the different components of a small cell, or 5G, system. (Source: [Texas 5G Alliance](#))

historic downtowns, the 5G rollout will present unique challenges, as connections to both electricity and broadband fiber are necessary for each small cell.

In a municipality with buried utilities, municipal officials should be thinking about the ability to handle additional broadband fiber underground. Communities will probably not want to see their ROWs being continuously dug up, so officials should be thinking about future demands when utilities are being worked on or extended. Once these small cells are installed, a municipality will want to make sure that road crews are aware of their existence and prepared to work with the new technology safely.

When planning for 5G technology, a municipality should encourage an equitable balance for the entire community. This means asking questions about the extent of coverage for the entire municipality, not just the more affluent neighborhoods to which the companies might be drawn. To encourage wider coverage, New York City has a sliding scale of fees for each small cell node. In a more distressed neighborhood, the application fees to the provider to install a node are lower, giving providers incentive to install small cell facilities in those neighborhoods. In more affluent Manhattan neighborhoods, where providers really want to be, those fees are higher. The goal is to make 5G coverage more accessible to all residents, and not only the ones who can necessarily afford it.

What About Federal Law?

The Telecommunications Act of 1996 is the main piece of Federal legislation regulating wireless providers. For local governments, there are five stipulations in the law that impact them the most, and that apply to small cell wireless facilities as well as the large towers:

- Local governments cannot unreasonably discriminate among providers of functionally equivalent services.
- Local governments cannot prohibit, or have the effect of prohibiting, the provision of personal wireless service.
- Local governments must act upon any application to place, construct or modify a wireless facility within a reasonable period of time.
- Any decision to deny an application to place, construct or modify a wireless facility shall be in writing and supported by substantial evidence contained in a written record.
- Local governments cannot regulate the placement, construction or modification of a wireless facility on the basis of environmental effects of radio frequency emissions, to the extent that such facilities comply with the Federal Communications Commission's (FCC) regulations concerning such emissions.

The law also acknowledges that state and local governments deserve fair and reasonable compensation from these providers for the use of the municipal ROW. Again, municipal ROWs are considered a desirable place for both macro towers and small cell nodes, because both require electricity and fiber optic cable connections, which are usually readily available.

In the race to 5G, the Federal Communications Commission (FCC) released a report and Order streamlining the process for the rollout of infrastructure for broadband services in September 2018. The Order, which went into effect on January 14, 2019, preserves local authority over land use and zoning decisions, but imposes limitations on that authority.

As with the siting of larger cell towers that communities have considered for decades, [shot clocks apply to small wireless facility applications](#) as well. The length of the shot clock depends on the particulars of where/how the facility is to be installed. A shot clock is the timeframe within which the municipality must act on the application. These shot clocks remain the same for one small cell facility or a batched application for hundreds.

The Order stipulates that local governments may regulate the small cell equipment for aesthetics, but not more restrictively than they would other equipment or infrastructure and regulation for aesthetics may not have the effect of prohibiting the service. The Order also

provides some guidance to local governments to set fees for the review of applications and for lease fees for small cell equipment on municipal infrastructure and in public rights-of-way with “safe harbor” amounts, above which local governments would have to defend if challenged on unreasonably high costs.

The FCC’s [order for 5G can be accessed online](#). Next Century Cities, a not-for-profit organization with the goal of supporting local officials to assure widespread, reliable, and affordable access to the internet, [has published a summary of the order](#). And the FCC has several documents on its website to [facilitate deployment of a 5G network](#).

Finally, as per FCC regulations, municipalities cannot use moratoria to delay these applications or use health impacts of wireless transmissions to deny applications. The [FDA has not found sufficient evidence](#) that there are adverse health impacts to humans caused by exposures at or under the current radiofrequency energy exposure limits.

What Comes Next?

Many questions about 5G technology remain unanswered, but we hope this article has helped educate you and other local officials on what 5G technology is, what it requires, and some of the challenges and opportunities that exist for local governments to consider as this technology rolls out. Given the fact that expansion of 5G service is easiest in built-up areas with plenty of underlying infrastructure already in place, we anticipate that Dutchess County will see early interest in 5G expansion primarily in our more urbanized communities in the south and west of the county. That said, local officials throughout the county are encouraged to be proactive in updating their comprehensive plans and land use regulations and to involve their municipal attorneys in the process to be prepared for applications for small cell facilities.

More Information

5G Resources:

- [§1.6001–§1.6100 State and Local Government Regulation of the Placement, Construction, and Modification of Personal Wireless Service Facilities](#), govregs.com
- [View recording and handouts from *The 5G Wireless Revolution: Pointers and Pitfalls for Land Use Boards*](#), a Dutchess County Planning Federation webinar (June 3, 2020)
- [5G Wireless Broadband 101](#), National Association of Counties
- [Summary of Final FCC Small Cell Order](#), Next Century Cities
 - [5G and Small Cell Resources](#), including municipal agreements
- [5G, Explained](#), MIT, Sloan School of Management
- [Small Cell Infrastructure Design Guidelines](#), Denver, CO (City and County)
 - [Small Cell Infrastructure in Denver](#) (Denver Public Works)
- [Small Cell Zoning Text Amendment](#), Telecommunication Facility Coordination Group, Montgomery County, MD

Local/NY Small Cell Zoning Code Examples:

- [City of Beacon, NY](#)
- [City of Saratoga Springs, NY](#)
- [Town of Bedford, NY](#)
- [Town of Guilderland, NY](#)
- [Town of LaGrange, NY](#)
- [Town of North Hempstead, NY](#)
- [Town of Salina, NY](#)
- [Village of Angola, NY](#)
- [Village of Hamburg, NY](#)
- [Village of Hilton, NY](#)
- [Village of Horseheads, NY](#)

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This newsletter was developed by the Dutchess County Department of Planning and Development, in conjunction with the Dutchess County Planning Federation.

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