

MAKING IT MESH



HOW THE HUDSON VALLEY CAN PREPARE FOR NEXT-GEN WIRELESS

JANUARY 2024

Introduction

Fast and reliable mobile connectivity is increasingly important to people in the Hudson Valley. Whether it's making a cellphone call, navigating with a GPS app while driving, or connecting with emergency services, we expect our mobile networks to be there when we call upon them. What we often take for granted is the vast and complex network of mobile facilities and infrastructure that make this connectivity possible. With a growing number of mobile users and "smart" devices, the demands on the network are growing and changing. However, deployment of the infrastructure necessary to accommodate these demands is often stymied by things like inadequate local policies, outdated zoning, cumbersome permitting processes, or strong public opposition.

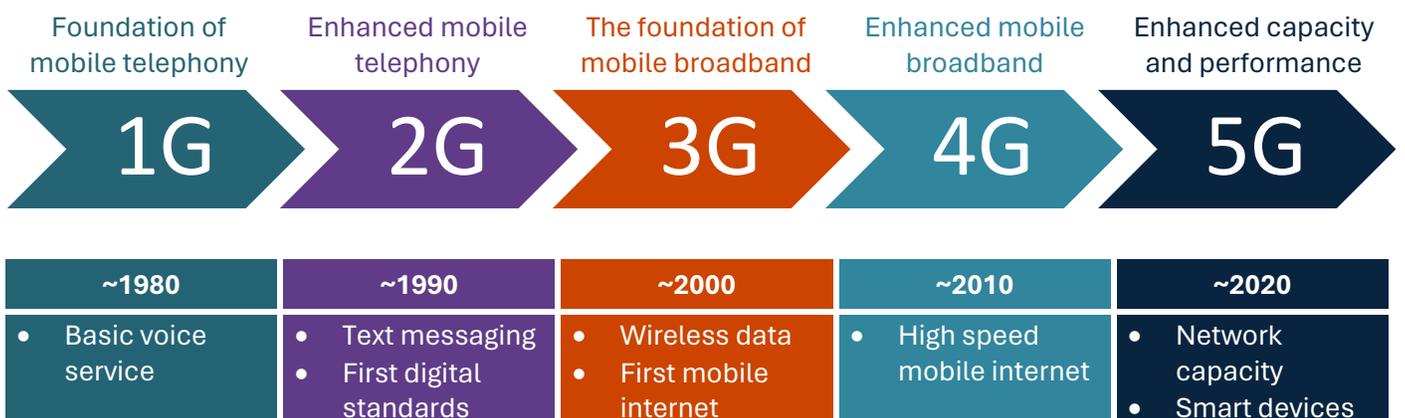
New York is what's known as a home rule state. The home rule system of governance provides municipalities in New York State with strong control over local land-use. This means that although there are state and federal regulations that apply to communications infrastructure, local governments will play a significant role in the future of mobile connectivity in the Hudson Valley region through municipal permitting processes, policies, and land use decisions.

This issue brief from Hudson Valley Pattern for Progress seeks to summarize the fundamentals of current and emerging mobile technology, identify common issues and barriers to mobile infrastructure deployment, and propose practical recommendations to address these issues, with an emphasis on solutions at the local government level.

Cover image courtesy of Crown Castle

The Evolution of the Mobile Network

The network of telecommunication infrastructure we have today is the result of decades of research and incremental technological advancements. It is a complex system of computers, cables, towers, and equipment; and involves numerous public and private stakeholders including service providers and government agencies. The most visible and public-facing component of the telecommunication network, and the subject of this issue brief, is the infrastructure that provides service to the end user. In recent years, this has primarily meant macrocells. Macrocells are high-powered towers or antennas that provide service to many users over a large coverage area. Essentially, macrocells are what probably come to mind when you think of a cell phone tower.



5G, shorthand for “fifth generation,” represents the next evolution of wireless mobile network technology. 5G expands and improves upon 4G technology in several ways. Compared to its predecessor, 5G boasts faster download speeds, optimization for different types of connections, and an increased capacity for simultaneous users. As more and more devices are connected to the internet, 5G represents an opportunity to accommodate increasing data traffic demands and opens the door for new and innovative applications of a robust mobile network.

Unlike the 4G, which connects to large cell towers, 5G instead relies on a numerous “small cell” nodes roughly the size of a backpack. These 5G base nodes are typically mounted on existing utility poles or buildings. Nodes are typically arranged as close as 500 feet apart, although the exact spacing varies based on local conditions and equipment specifications. This setup, known as a mesh network, allows the small-cell nodes to quickly communicate with each other while relaying data to larger hubs that are wired to a high-speed fiber network. This dense arrangement of base stations is necessary because 5G utilizes high-frequency electromagnetic waves. The higher frequency increases capacity for data transmission, but reduces effective range.

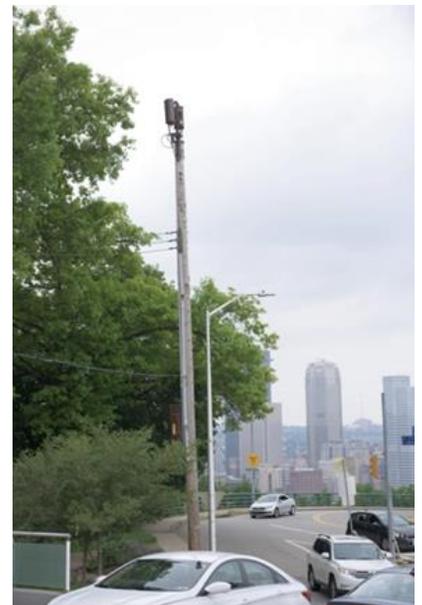
Traditional Macrocell tower



5G node on a lamp post



5G node on a utility pole



5G node images courtesy of Crown Castle

Why the Hudson Valley Should Care

Meet the Moment

Telecommunication companies like Verizon, AT&T, and Sprint are all preparing for significant investment and deployment of next-generation wireless technology. According to an estimate from AT&T, providers are primed to deploy hundreds of thousands of wireless facilities in the next few years, outpacing the number of wireless facilities deployed in the last few decades.¹ Crown Castle, a telecom infrastructure company, will deploy 10,000 small cells in 2023 and expects to increase their annual deployment to 14,000 new small cells in 2024.² With the telecom industry poised to make these network investments, it is critically important for municipal leaders to educate themselves about emerging wireless technology and put their communities in a position to make timely and informed decisions.

Remain Competitive

5G is being developed and implemented as the new standard for wireless technology throughout the world. If municipalities in the Hudson Valley collectively make the region a difficult place to build out 5G technology and telecom infrastructure, the companies that build these systems will seek to invest elsewhere. In many cases these are large multinational companies with long planning horizons. If the region misses out on key investments, it could be put at a serious competitive disadvantage.

Home Internet

Some telecommunication companies like T-Mobile and Verizon are pursuing 5G as a replacement for traditional broadband home internet. As this technology advances and becomes more widely available, it could have a significant impact for home internet access. It could both improve the quality and the price of available home internet, especially in areas in the region that currently have only one available internet service provider. Many communities throughout the Hudson Valley only have one company that provides wired high-speed internet to homes and businesses. 5G home internet could provide wireless access at similar speeds, increase the number of options for consumers, and potentially drive down the cost as multiple companies compete for home and business customers.

¹ <https://docs.fcc.gov/public/attachments/FCC-18-133A1.pdf>

² <https://www.lightreading.com/5g/crown-castle-to-accelerate-small-cell-pace-in-2024>

More Capacity

When the cellular network was first built, there was an emphasis on comprehensive coverage to prevent dropped calls. Now, with widespread smartphone usage and an increasing number of other smart devices connecting to the network, there is a greater focus on network capacity, i.e. how many devices can be connected at once. Depending on local needs and conditions, increasing capacity could mean building a new macrocell tower or installing 5G nodes.

Emergency services

Reliable wireless coverage and capacity is critically important for accessing emergency services. The network needs adequate coverage to ensure that emergency services can be reached even in remote areas of the region. Network capacity is also important, especially at large gatherings like festivals or concerts when multiple mobile devices are trying to connect to the network in one location. Reliable coverage is only possible when the necessary infrastructure can be built where it is most needed.

Legal and Regulatory Environment

In 1996, Congress enacted the Telecommunications Act, introducing significant new regulations designed to facilitate the deployment of telecommunication infrastructure throughout the country. A key part of this legislation, Section 235, makes it illegal for any state or local government to pass a law that prohibits or has the effect of prohibiting the ability of any entity to provide interstate or intrastate telecommunication service. Since its adoption in 1996, the interpretation of this provision of the Telecommunications Act has been the subject of several legal battles, with courts throughout the country arriving at different and often contradictory interpretations.

The Federal Communications Commission (FCC) is the federal agency with regulatory authority over international and interstate communication in the United States. Citing the importance of next-generation wireless technology and the desire to remain internationally competitive, in the past few years the FCC has made efforts to remove regulatory and procedural barriers to 5G and the deployment of telecommunication infrastructure in general.

In March 2018, the FCC made changes to its own procedures to exclude small cell projects from some federal review procedures that were originally designed for larger towers. Later that same year, the FCC issued a declaratory ruling that, among other things, sought to clarify the legal interpretation of Section 235 of the 1996 Telecommunications Act and introduced a new “shot clock” standards for small cell review.

Impactful Provisions of the September 26, 2018 FCC Declaratory Ruling

Clarification on what constitutes a prohibition or effective prohibition on the ability to provide telecommunication services	Criteria for fees related to telecommunication infrastructure	Maximum application review shot clock for 5G small cell infrastructure
<ul style="list-style-type: none"> • “Materially limits or inhibits the ability of any competitor or potential competitor to compete in a fair and balanced legal and regulatory environment.” • “Materially limit” can apply to state and local fees and aesthetic requirements. • A legal requirement can constitute an effective prohibition of services even if it is not an insurmountable barrier. 	<ul style="list-style-type: none"> • Fees are a reasonable approximation of the state or local government’s costs. • Only objectively reasonable costs are factored into the fees. • Fees are no higher than the fees charged to similarly-situated competitors in similar situations. 	<ul style="list-style-type: none"> • 60 days for review of an application for collocation of Small Wireless Facilities using a preexisting structure. • 90 days for review of an application for attachment of Small Wireless Facilities using a new structure.

Across the country, state governments are introducing legislation related to 5G and mobile telecommunication infrastructure. In recent years, several of these bills have been introduced in both houses of the New York State Legislature. Similar to the FCC’s efforts, most of these bills aim to reduce regulatory barriers and streamline local application processes. Many of these bills have been reintroduced in multiple legislative sessions, but none has made it beyond senate and assembly committees.

Recent Bills Introduced in the New York State Legislature

“Wireless Facility Siting Act” Assembly Bill A2636	
Description	Status
<ul style="list-style-type: none"> • Create enabling legislation to establish a uniform statewide process for municipal review of applications for the placement, construction, and modification of wireless services facilities. • Still allows for municipalities to enact stricter approval processes. • Establish review period shot clock. 	<ul style="list-style-type: none"> • First version of the assembly bill originally introduced in the 2009-2010 legislative session. Reintroduced in every subsequent legislative session but has never made it out of committee. • Currently in committee for the 2023-2024 legislative session.

“Wireless Broadband Eligible Facility Permitting Act” Assembly Bill A30 & Senate Bill S26	
Description	Status
<ul style="list-style-type: none"> • Exempts certain modifications of existing wireless facilities from municipal zoning and permitting. • Establish a statewide uniform process for permitting wireless facility modifications. • Establish review period shot clock. 	<ul style="list-style-type: none"> • Senate and Assembly bill originally introduced in the 2015-2016 legislative session. Reintroduced in every subsequent legislative session but has never made it out of committee. • Currently in committee in both the Assembly and the Senate for the 2023-2024 legislative session.

Assembly Bill A7303 & Senate Bill S4600	
Description	Status
<ul style="list-style-type: none"> • Prohibits municipalities from entering into an agreement for exclusive use of the right of way for wireless facilities. • Prohibits municipalities from overcharging for access to the right of way. • Enables wireless providers to make certain modifications to wireless facilities in the right of way as of right, and not subject to local zoning. Municipalities can still require a permit. 	<ul style="list-style-type: none"> • First version of the Assembly bill originally introduced in the 2019-2020 legislative session. Reintroduced in the 2021-2022 legislative session in the Assembly and Senate. • Currently in committee for the 2023-2024 legislative session.

Assembly Bill A6633	
Description	Status
<ul style="list-style-type: none"> • Establishes a temporary commission to study the environmental and health effects of evolving 5G technology. • 15-member commission to be comprised of state officials and experts in the fields of public health, telecommunications, and the environment. 	<ul style="list-style-type: none"> • First version of the Assembly bill originally introduced in the 2021-2022 legislative session. • Currently in committee for the 2023-2024 legislative session committee.

Challenges to Mobile Telecommunication Infrastructure Deployment

Local Government Application Review

Local governments play a significant role in the review and permitting process for 5G infrastructure. Because local planning and permitting processes are not keeping up with the pace of technology, the local review process can often hamper the deployment of 5G small-cell nodes and other equipment that is needed to increase the speed, bandwidth and coverage of regional mobile networks. Many of our local governments in the Hudson Valley remain ill-equipped to evaluate and process telecommunication infrastructure applications in a timely manner.

Lack of a Standard Review Process

The strong local land use control afforded to municipalities in our home rule State of New York means that the review process for mobile telecommunication infrastructure applications can vary significantly from municipality to municipality. This creates a logistical headache for companies seeking to deploy this infrastructure as they must deal with a different application review process in every town, village, and city in the region. This environment of uncertain project timelines makes it difficult for telecom companies to efficiently plan and pursue 5G deployment.

Health and Safety Concerns

There is significant skepticism and concern about the safety of telecommunication equipment and 5G technology in particular. The most common health-related concern is the potential impact of radiofrequency (RF) waves emitted by cellphone towers and small-cell nodes. Organizations such as the Centers for Disease Control and Prevention (CDC), World Health Organization (WHO), and American Cancer Society have all found that there is no strong evidence that wireless technology has adverse effects on human health. However, many agree that as an emerging technology, possible health impacts of 5G technology merit additional research. Regardless of the actual health impacts of wireless technology, the fact remains that public concern and distrust can be powerful barriers to infrastructure deployment.

Cost of Installation

The various fees and costs associated with wireless infrastructure can make a potential project become prohibitively expensive. This is particularly true for 5G deployment that requires multiple nodes to be installed in one community. Municipalities commonly have a per-application fee which works for the large macrocell towers but can be prohibitively expensive for multiple small-cell nodes.

In some cases, municipal fees that are ostensibly put in place to cover the administrative and labor costs associated with the installation of the hardware are in practice abused as a way for the municipality to collect extra revenue. In addition to municipal fees, attaching telecommunication equipment to a utility pole typically comes with other “make ready” costs such as the cost to rearrange the existing equipment on the pole, engineering work necessary to accommodate the new equipment, or even the cost to replace the pole entirely.

Appearance

Though the small-cell equipment boxes are relatively small for telecommunication hardware, the appearance of 5G nodes is of concern in many communities. Though they are small, communities are considering the cumulative visual impact of multiple 5G nodes in a single area. Another common area of contention is the appearance of 5G nodes in historic districts where strict design standards are in place to maintain the historic look of the area. 5G nodes can be designed or installed in ways that mitigate the visual impact, but these additional measures typically come with increased costs.

Outdated Zoning

Municipal zoning codes have not kept up with changing wireless broadband technology. Macrocell towers are often only allowed in zoning districts with primarily industrial or manufacturing uses. As the demand on the network shifts from coverage to capacity, wireless infrastructure is increasingly needed in areas where such infrastructure is typically not permitted, like residential zones. Many municipal codes were developed well before 5G technology was invented and could not anticipate the need to locate multiple small-cell nodes in a residential neighborhood.

Rule Enforcement

Many of the challenges identified above are theoretically mitigated by federal law and oversight by the FCC. The FCC has ruled that things like delayed applications and high application costs can constitute an effective prohibition on wireless technology and are therefore illegal. However, in practice, the enforcement of these rules is costly and time consuming for entities seeking a remedy. In instances where local governments break federal law, the companies seeking to deploy the wireless infrastructure have to sue for the proper actions to be taken. Court actions create additional delays and set up adversarial relationships in communities where these companies want to deliver an in-demand utility.

Local Strategies and Recommendations

Municipal leaders are tasked with creating a regulatory environment that does not obstruct the deployment of wireless infrastructure, while still protecting the aesthetics of the community and the health and safety of residents. There are several potential strategies that can be implemented locally in pursuit of striking this balance. Regardless of the approach taken, the most important thing a community can do is be proactive. Communities that understand the issues and have a plan will be in a much better position to make informed decisions while communities that remain passive will find themselves on their back foot making reactive choices that may be to the detriment of their residents.

Become 5G Ready

As an emerging technology, consideration of small-cell 5G infrastructure is not found in many municipal policies and codes. Municipalities should review and update local regulations to ensure they are ready to address 5G applications. This is particularly important in urban or suburban communities where small cells are more feasible. At a minimum, municipalities should consider defining small-cell 5G infrastructure in zoning regulations or other pertinent local administrative policies. Other items to consider include preferred siting locations, clear design guidelines, and an application process with appropriate timelines and fee structures designed to accommodate the multi-site nature of 5G infrastructure.

Design Guidelines

While FCC regulations dictate that municipalities cannot enforce design standards that effectively prohibit the deployment of wireless infrastructure, they can still enact reasonable standards to mitigate the appearance of both macrocell towers and small-cell nodes. Common approaches to limiting the visual impact of wireless infrastructure includes hiding the equipment within flag poles or lamp posts, decorative facades to disguise the equipment, or artwork on to make the equipment more appealing. Municipalities can hold applicants to their preferred design standards unless the applicant can provide evidence that the design standards act as an effective prohibition.

5G Infrastructure in the “Vibe District” of Virginia Beach



Location

Municipalities should take a proactive approach to identifying and establishing preferred locations for wireless infrastructure. While they may not be able to anticipate the ideal location from the standpoint of a service provider, they can at least establish preferred areas within the municipality and a framework for siting decisions. Municipalities should consider encouraging the co-location of wireless facilities, i.e. locating new infrastructure in an existing wireless infrastructure location. This approach is desirable as it typically has limited to no additional visual impact and utilizes a site that was previously determined to be suitable for the needs of the service provider. Municipalities can encourage co-location through strategies such as a streamlined approval process or reduced fees.

Education

While this issue brief offers a primer on emerging wireless technology trends and considerations and strategies, this complex topic warrants further attention and study for local decision makers. It is important that elected officials, municipal employees, and planning board members are knowledgeable about the evolution of wireless infrastructure and the role they play in its deployment. Given the technical nature of this topic, municipalities often hire consultants to provide assistance with wireless technology applications. While this may be the best course of action, it is still important for local decision makers to be informed so they are not at the whim of consultants.

City of White Plains

In 2023 the City of White Plains adopted a local ordinance to address the deployment of 5G infrastructure in the city. As is the case in many communities, there was substantial local debate leading up to the adoption of the ordinance as residents voiced concerns about the perceived health and safety risks related to 5G infrastructure. Key provisions of the ordinance include:

- Preference for locating small wireless facilities in industrial districts.
- Unless technically infeasible, no small wireless facility can be located on or near residential buildings, schools, or daycares.
- Independent testing to ensure that small wireless facilities are meeting FCC guidelines for local radiation exposure, paid for by the owner of the facility.
- Required liability insurance for small wireless facility applicants.

City of Beacon

The City of Beacon has a fee schedule specific to permits for small-cell wireless facilities. The fee structure charges \$500 for a non-recurring application for up to five locations, with an additional \$100 for each small wireless facility beyond five. In 2021 the City of Beacon adopted the “Small Cell Wireless Facility Design and Review Guideline Policy” that included:

- Detailed aesthetic and location guidelines.
- Preference for locating small wireless facilities in industrial or commercial districts.
- Wireless telecommunication facilities cannot be located in the Central Main Street District or Historic District Landmark Overlay Zone unless the applicant can demonstrate that it is necessary to provide wireless services, including but not limited to, filling a gap in coverage, densifying a wireless network, introducing a new service or otherwise improving service capabilities.



HUDSON VALLEY PATTERN *for* PROGRESS

Hudson Valley Pattern for Progress is a nonprofit organization that provides objective research, planning and educational training throughout the region. Its work identifies civic challenges and promotes regional, equitable, and sustainable solutions to constantly improve the quality of life in Hudson Valley communities. Pattern develops its work upon a considerable foundation of facts and experience, without political aims or affiliations.

Pattern was founded in 1965 by the region's academic, business, and nonprofit leaders. Our work focuses on housing, community and urban planning, downtown revitalization, infrastructure, transportation, demographic change, and more. We serve the counties of Columbia, Dutchess, Greene, Orange, Putnam, Rockland, Sullivan, Ulster and Westchester.

Pattern's independent research, including *Making it Mesh*, is supported by our members. Become a member today and support our mission to provide thorough, objective, accurate research on civic issues that affect our quality of life in the Hudson Valley!

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