

# Small Cell Infrastructure in Denver



The City and County of Denver is managing requests from wireless providers and wireless infrastructure companies to construct small cell facilities in the public right of way.

## *What are Small Cell facilities?*

- Small Cell facilities are low-powered antennas that provide cellular and data coverage to smaller geographic areas, supplementing a larger cellular network.
- Small Cell equipment is proposed to be located on poles, wires, or buildings.
- Small Cell equipment is allowed in the public right of way as defined by Federal and State Law just like other utilities.
- Small Cell equipment will initially meet current 4G (LTE) voice and data demands but is being rapidly evolved to provide future 5G higher speed data services as technology changes.

## *What is the role of Denver Department of Transportation & Infrastructure (DOTI) related to Small Cell infrastructure?*

- Denver DOTI reviews applications for Small Cell equipment in the public ROW.
- Requests for Small Cell equipment on new freestanding poles are processed as Encroachment Permits. State and federal law requires the City to process applications in batches (currently 10 poles or less per application), and in 90 days or less.
- Denver DOTI has developed Design Guidelines that standardize and minimize the physical and aesthetic footprint of equipment while satisfying equipment needs of Small Cell carriers.
- Denver's Design Guidelines have become a leading model for limiting, but not restricting the Small Cell industry to preserve the best interests of its citizens.
- Denver DOTI continues to redirect over 90% of Small Cell deployments towards co-location onto existing street lights and infrastructure where possible.

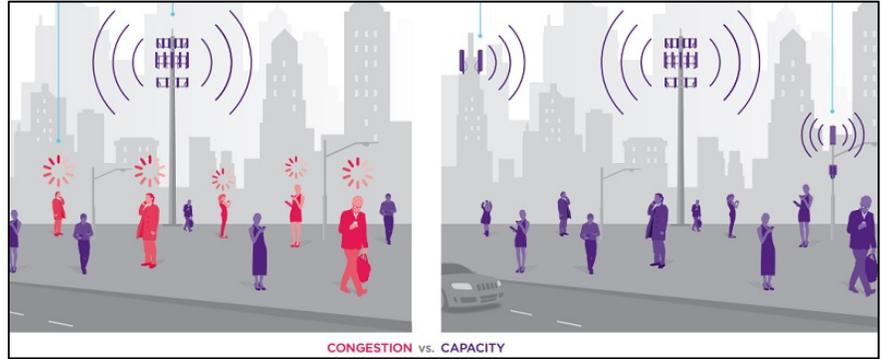


# Small Cell Infrastructure is coming to Denver

Here's the current state of Small Cell technology, as we understand it from the wireless carrier industry.

## 1. Why are we seeing a surge in interest to install wireless infrastructure?

Researchers say mobile data traffic in North America has grown exponentially and is projected to continue increasing at a rapid rate with the proliferation of mobile devices. In our City, there has been a surge in population and economic growth, and wireless carrier companies are indicating that existing infrastructure is becoming congested and cannot continue to meet the demands of their customers.



Source: Crown Castle

## 2. What type of infrastructure is proposed?

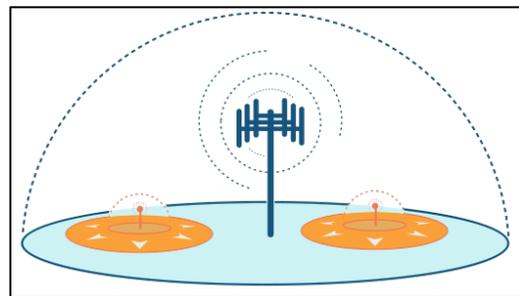
Wireless carrier companies have indicated that until recently, wireless phone service in general has been managed using large antennas mounted on towers located on both public and private property. Those antennas serve relatively large areas, or "cells" up to several miles away. Carriers have explained to the City that existing cell sites are already congested and that installing more cell towers covering large areas will not keep up with projected demand for high speed wireless data that is growing rapidly.



Typical large cellular antenna.

Credit: Joe Ravi via Wikimedia Commons

To meet demands for wireless data, carriers have begun using new lower-powered antenna technology to "offload" data traffic from the larger cell towers. Each of these smaller antennas serves a much smaller area (1-2 blocks) but with much higher data volumes. This type of wireless infrastructure is referred to as "Small Cell."



Data is transferred from Small Cells to large antenna

Source: Qualcomm Technology

Towers	Small cells
Good for voice. Data signal can degrade over distance.	Good for voice and data.
VOICE: ★★★★★ DATA: ★★☆☆☆	VOICE: ★★★★★ DATA: ★★★★★

Source: Crown Castle

Small Cell antenna equipment must comply with maximum volume requirements of Federal and State law. The types of equipment and method of deployment being proposed in Denver will vary widely and depend upon the network needs and technology requirements of the various wireless carriers. Typical antenna locations are expected to be:

- Mounted onto existing utility or street lighting poles.
- Placed onto new freestanding poles erected in the public right of way.
- Strung on wires between existing poles.
- Mounted onto existing buildings on public and private property.



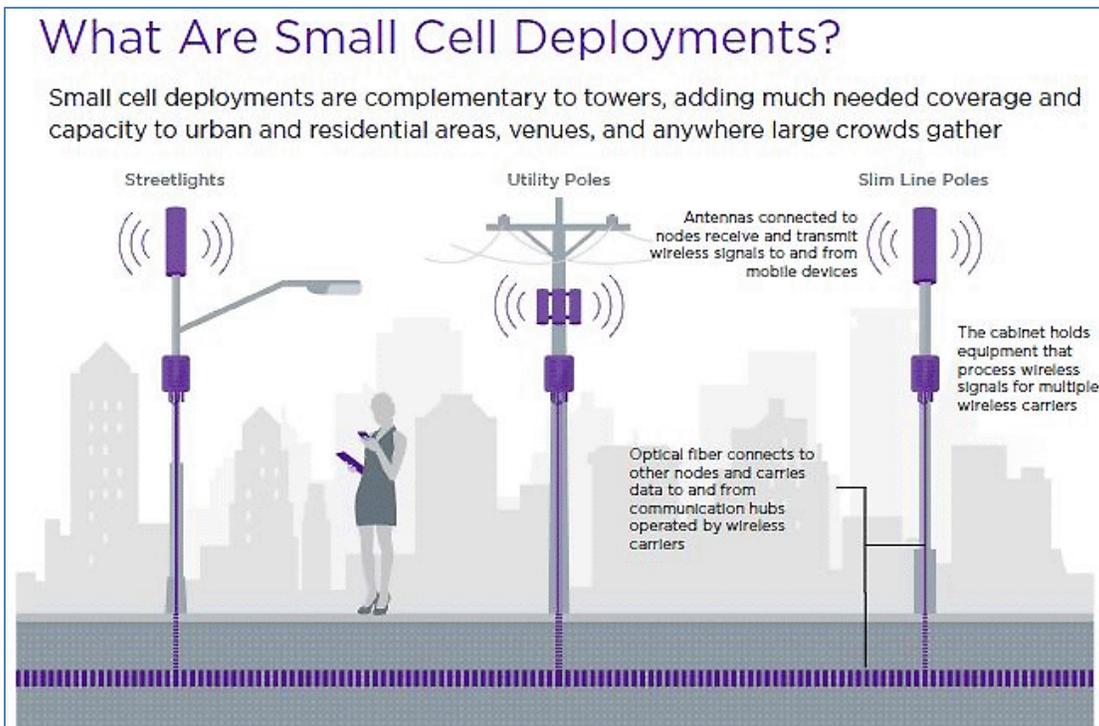
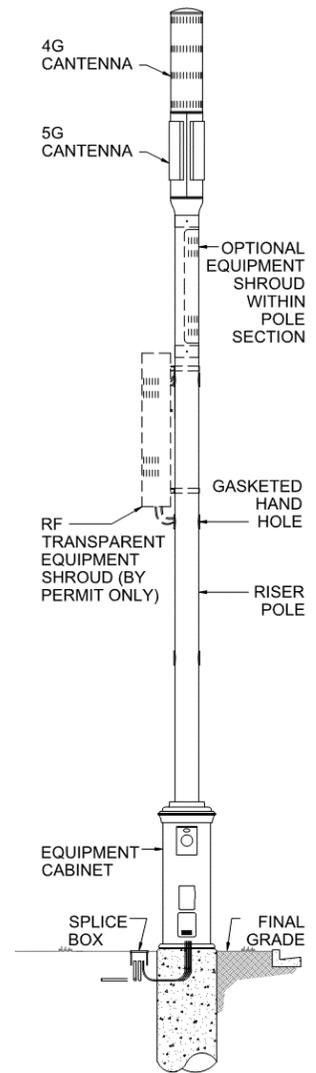
There are thousands of Small Cell units already operating nationwide, and federal rulemaking continues to encourage new investment by private companies. Requests for Small Cell antenna installations in the City of Denver are expected to continue to increase as

wireless companies work to meet the increasing wireless data demands of their customers. Current projections indicate that thousands of additional Small Cell antennas may be proposed in Denver by cellular carrier companies.

It appears that most new infrastructure being proposed today is servicing 4G (“4<sup>th</sup> Generation”) cellular and data needs, also known as “LTE”, and new 5G (“5<sup>th</sup> Generation”) wireless networks, expected to service even higher speed data demands.

### 3. Types of Applicants

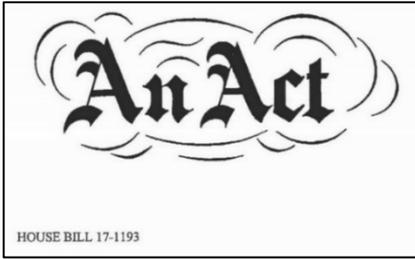
Denver has learned that the companies that are proposing Small Cell infrastructure follow different business and ownership models. Some companies will construct their own infrastructure to service wireless demand from their own customers (AT&T and Verizon Wireless, for example).



Source: Crown Castle

Other companies will construct wireless infrastructure and then lease equipment or sell service to wireless providers that do not wish to construct and own their own equipment (Crown Castle for T-Mobile, and Mobilitie for Sprint, as examples).

#### 4. Federal and State Law on Small Cell Infrastructure



Wireless infrastructure is subject to the parameters of Federal Communications Commission (FCC) and State law. Colorado State House Bill 2017A\_1193 and FCC regulation 18-133 enacted in early 2019 have mandated that wireless providers have the legal right to locate Small Cell equipment in the public rights of way of Colorado.

The new State law is specific that municipalities may not entirely deny or discriminate against Small Cell infrastructure, treating the equipment in the same way as other permitted users and utilities in the right of way. However, Denver still maintains the authority to regulate new Small Cell equipment based on public health, safety, and welfare not related to RF emissions, and deny or require change to proposals that conflict with other uses of the public right of way or are otherwise unlawful.

#### 5. How are Xcel Energy utility and street light poles being leveraged?

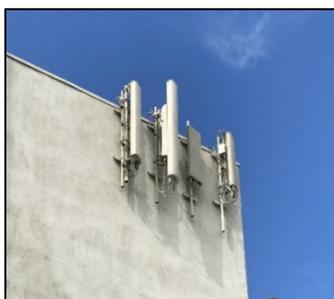
The City and County of Denver does not own or maintain most existing street lighting, utility, or traffic signal poles in the public right of way. Most of these existing poles are owned and maintained by Xcel Energy or other utility companies. Since Small Cell programs initially approached Denver, the City has strongly expressed its preference for Xcel Energy pole facilities to be used to significantly reduce the amount of new antenna poles in Denver.

While collaborating with the City on Design Guideline requirements and strategy, Xcel developed legal agreements with each company and a comprehensive approval and review program. As of 2019, the City is proud to announce that Xcel is currently accepting Small Cell co-location applications from all carriers, and that over 90% of all new Small Cell antennas proposed in Denver have been redirected to Xcel Energy facilities rather than brand new pole locations in the public right of way.

Of note, Xcel Energy also owns and maintains most of the traffic signal poles in Denver (typically located at street intersections). The City of Denver has an exclusive agreement with Xcel Energy to locate signal, emergency response, and other municipal equipment (cameras, etc.) on traffic signal poles. The City continues to evaluate whether it will be possible to allow additional wireless infrastructure on these poles without conflicting with current traffic or safety equipment.



#### 6. Why can't cellular infrastructure be located on private property?



A quick glance around most parts of Denver will reveal many cellular antennas already located on private property. However, because of the complexities and length of time to create agreements with individual property owners, many companies have disclosed to the City that it is not feasible to deploy Small Cell equipment in this manner and still meet current data demands.

If and when a company identifies a good location for mounting Small Cell equipment on private property, it will be regulated by the City's Community Planning and Development Division using requirements of the current Denver [Zoning Code](#). The Zoning Code

includes parameters for height, size, placement, etc. on private property to preserve the intent and character of the zoning district. Zoning Code requirements do not apply in public right of way.

## 7. Why can't cellular infrastructure be combined onto one pole?

For now, the City understands that the siting of Small Cell antennas is dictated by the wireless provider and its customer's needs, terrain, and radio frequency modeling results. Each wireless provider has different objectives and may not need the same locations. Each carrier, who owns rights to a spectrum of operating frequency, states that some separation with competing antennas is necessary to avoid signal interference.

With that said, the City understands that Small Cell technology is evolving rapidly towards the ability to share antennas or even poles between multiple carriers. The City is exploring all options and continues to encourage pilot programs that demonstrate how the equipment for multiple carriers can be combined into a single pole, with the long-term goal of minimizing the amount of new infrastructure placed in the public right of way.

## 8. How is the City handling Small Cell infrastructure proposed in the public right of way?

The City is currently reviewing all new pole applications in conjunction with Federal and State law, as well as Denver Rules and Ordinances. Denver DOTI is the responsible entity for permitting any infrastructure, object, or construction in the public right of way of Denver.

DOTI currently performs careful consultation with top executive and program management staff from each wireless provider about proposed infrastructure programs before the provider is allowed to submit any applications for approval. This ensures that each provider approaches the City in a consistent manner, and that the City's current policies and permitting procedures are well known at the outset.

Per Federal and State law, the City must allow each company to propose their infrastructure in the public ROW. Additionally, the City must offer permitting procedures that can process "bulk" Small Cell programs in batches, in 90 days or less, rather than requiring individual permits for each pole or antenna.

In response to these requirements, DOTI has established a plan review and permitting program that combines existing Utility Plan Review and Encroachment Permitting into one contiguous process. Each applicant may submit batches of 10 or fewer unique poles or pieces of ground-mounted equipment per application. Each application will result in a revocable Encroachment Permit. This batch permitting system ensures that each Small Cell application follows the same procedures and

standards as any other user of the public right of way, while minimizing City processing and administration labor.

Each Encroachment Permit requires a complete and public-facing plan review process of brand new small cell pole locations. DOTI logs each application for review by internal and external stakeholders (such as utility companies, etc.), special Districts, and known neighborhood groups using an electronic plan review website. The City has created procedures that will also ensure the applicant has notified adjacent property owners at each newly proposed pole location during this process.

Any comments received from the plan review process are accepted and must be addressed by the applicant. Comments that are deemed to have technical merit (identifying unlawful or conflicting proposed infrastructure) are required to be fully resolved by the applicant.

If an Encroachment Permit is issued, the associated batch of new poles is approved to proceed to Right of Way Construction Permitting.

Of note, the very first Encroachment Permit for ground-mounted Small Cell equipment by any Company requires approval by City Council. Each pole or piece of ground-mounted equipment approved by an Encroachment Permit requires a \$200 annual fee, and every Permit is revocable by the City under specified circumstances. Also, not all procedures necessarily apply to co-location since existing street lights or infrastructure are being used.

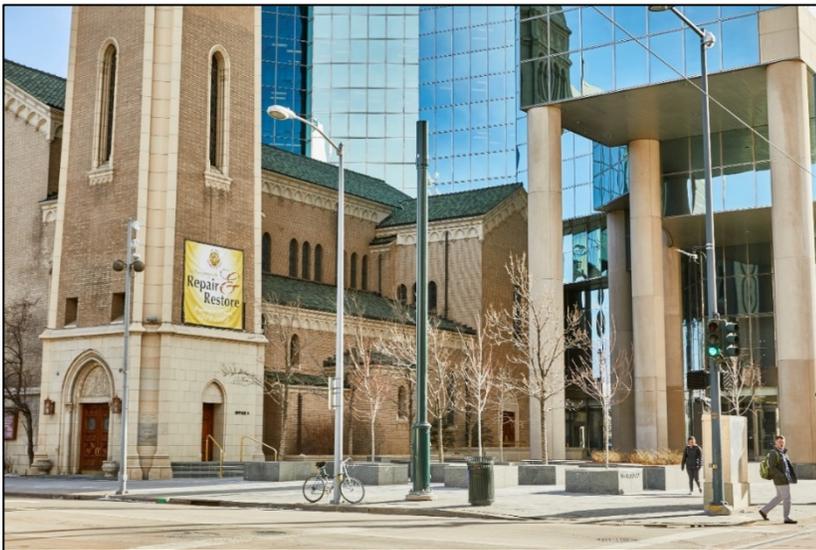


## 9. Can the City limit or standardize Small Cell infrastructure?

As mentioned above, the City continues improve Design Guidelines for Small Cell infrastructure to maximize its ability to protect the health, safety and welfare of the citizens and residents of Denver within the parameters of Federal and State law. As of June, 2019, DOTI has released its second version of Design Guidelines that:

- Standardize pole design elements, color and location to meet character of existing infrastructure in the public ROW.
- Limits pole heights to match existing street lighting and other adjacent poles in the public right of way.
- Generally prevents placing poles adjacent to parks, historical places, or close to similar freestanding antenna poles.
- Creates a platform for all carriers that enclose as much equipment as possible to minimize visual impact.
- Requires radiofrequency emissions information for all proposed equipment that can be understood by the public.
- Permits consistent infrastructure that does not discriminate based on neighborhood type, demographic, or character.
- Provides options for concepts in combining equipment from multiple companies into single poles.

DOTI has placed top priority in coordinating design elements for proposed Small Cell infrastructure, and how companies should maximize aesthetics while minimizing congestion of the public right of way. Below are examples of new Small Cell equipment recently constructed in Denver.



## 10. Where can I find more information?

*City and County of Denver Small Cell Program Webpage*

<https://www.denvergov.org/Government/Departments/Department-of-Transportation-and-Infrastructure/Programs-Services/Small-Cell>

*City and County of Denver Small Cell Infrastructure Design Guidelines*

[https://www.denvergov.org/files/assets/public/doti/documents/standards/pwes-016.1-small\\_cell\\_infrastructure\\_design\\_guidelines.pdf](https://www.denvergov.org/files/assets/public/doti/documents/standards/pwes-016.1-small_cell_infrastructure_design_guidelines.pdf)

*City and County of Denver Small Cell Location Map*

<https://geospatialdenver.maps.arcgis.com/apps/webappviewer/index.html?id=038ec7144de44eddbc473f28c18bf73e>

## 11. Who can I contact?

The City and County of Denver strongly encourages direct communication with the specific wireless provider or company who is installing specific equipment. City and County of Denver staff is also available to discuss processing and policy related questions. The following list of contacts that have approached the City so far is provided for your convenience:

## Denver Small Cell Contact List

NAME	CONTACT INFORMATION	AFFILIATION
AT&T Wireless:	<a href="https://buildingour5gfuture.com/information/">https://buildingour5gfuture.com/information/</a>	
Crown Castle (currently servicing T-Mobile)	<a href="mailto:denver@crowncastle.com">denver@crowncastle.com</a> <a href="https://www.crowncastle.com/communities/denver-co">https://www.crowncastle.com/communities/denver-co</a>	
Mobilitie (currently servicing Sprint): Christy Eichorn	<a href="mailto:ceichorn@mobilitie.com">ceichorn@mobilitie.com</a> (402) 871-8438	
Verizon Wireless	<a href="mailto:vzwnetworkcolorado@verizonwireless.com">vzwnetworkcolorado@verizonwireless.com</a> <a href="https://denverttechfuture.org">https://denverttechfuture.org</a>	
Zayo Group: Jason Jorgensen	<a href="mailto:Jason.Jorgensen@zayo.com">Jason.Jorgensen@zayo.com</a> (303) 381-3368 <a href="https://www.zayo.com/services/mobile-infrastructure/small-cell/#sc-tabs-1568050321421">https://www.zayo.com/services/mobile-infrastructure/small-cell/#sc-tabs-1568050321421</a>	
Xcel Energy Facility Attachments:	<a href="mailto:DualUseStreetlightPoles@xcelenergy.com">DualUseStreetlightPoles@xcelenergy.com</a> (303) 425-3876 <a href="https://www.xcelenergy.com/">https://www.xcelenergy.com/</a>	
Denver DOTI Small Cell Permit Team:	<a href="mailto:DOTI.SmallCell@denvergov.org">DOTI.SmallCell@denvergov.org</a>	
Denver DOTI Communications & Marketing:	<a href="mailto:DOTI.Comms@denvergov.org">DOTI.Comms@denvergov.org</a>	