

Small Cell Infrastructure



CITY OF
MADISON

The City of Madison is getting ready for 5G implementation. The City is developing guidelines that will allow cellular companies to locate Small Cell installations in a way that maximizes technological benefits, while attempting to preserve street-side aesthetics.

What are Small Cell facilities?

- Small Cell facilities are low-powered antennas that provide cellular and data coverage to smaller geographic areas, supplementing the 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 per Federal and State Law just like other utilities.
- Small Cell equipment will initially meet current 4G (LTE) voice and data demands, but may be modified with future 5G higher speed equipment as technology changes.

What is the role of City of Madison Public Works related to Small Cell infrastructure?

City of Madison Public Works reviews applications for Small Cell equipment in the public right-of-way.

- Make sure proposed locations are consistent with MGO for locations, type, and aesthetics.
- Review calculations to make sure installations are safe.
- Review to avoid conflicts with other public infrastructure.

Public Works also inspects installations for consistency with approved plans and permits.



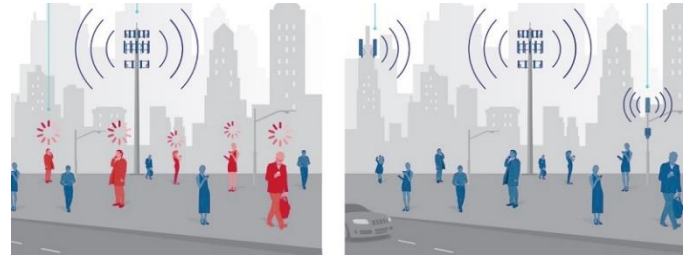
Small Cell Infrastructure in Madison

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 requests to build Small Cells?

Researchers say mobile data traffic in North America has grown significantly, and is projected to continue increasing at a rapid rate with the proliferation of mobile devices.

Wireless carrier companies have expressed concerns that the existing infrastructure is becoming congested and cannot continue to meet the demands of their customers.



Congestion vs. Capacity. Source: Crown Castle.

2. What type of infrastructure could be proposed?

Currently, wireless carriers have been providing service mostly by the use of large antennas mounted on towers. These antennas provide service to large areas (known as "cells") up to several miles away, but these large antennas cannot keep up with increasing demand for high speed wireless data.

To meet demands, carriers started to implement the use of smaller, lower-powered antennas known as "Small Cells," in addition to the large antenna towers. These smaller antennas provide an area with higher data volume than the large towers, but in a much smaller area (1-2 blocks). Since these antennas serve smaller areas, they need to be installed in more frequent locations to properly serve the projected data demand.

Per federal regulations, the Small Cell antenna may be no larger than 3 cubic feet in volume (about the size of a large suitcase), and all equipment associated with the Small Cell technology, including the antenna, may be no larger than 28 cubic feet, and any equipment attached to strands between poles has a maximum size of 1 cubic foot.

The types of equipment, locations, and methods of installation are expected to vary around the City of Madison and will depend on the network needs of a particular area.

Typical locations for new Small Cell antenna locations are expected to be:

- Mounted on existing utility poles
- Mounted on new freestanding poles
- Attached to existing overhead lines strung between poles
- Mounted onto existing buildings



Possible small cell locations, on existing utilities (left), or new freestanding poles (right).

With the increase in demand for network data, along with advancement in the technology from the current 4G data network to 5G wireless networks, it is expected that requests by wireless providers for new Small Cell antenna installations will increase. In order to serve the higher speed data adequately, these antenna installations will need to be more densely spaced.

3. Types of Applicants

Companies that intend to install Small Cell infrastructure follow a couple of different business models. Some providers may construct their own infrastructure to serve the wireless demand of their customers (Verizon and AT&T, for example).

Other companies may install this infrastructure and then lease or sell the use of this equipment to wireless providers that do not wish to construct and maintain their own.

4. Federal and State Law on Small Cell Infrastructure

Federal and State Law on Small Cell Infrastructure: Local regulation of wireless infrastructure is subject to the parameters of Federal and State Law. In 2018, the Federal Communications Commission (FCC) issued a series of orders that imposed requirements on municipalities regarding wireless infrastructure regulations. Under the FCC orders, no local regulation may prohibit or have the effect of prohibiting the ability of any entity to provide telecommunications service. Any local regulations must be competitively neutral and nondiscriminatory.

Under State law, municipalities retain the authority to regulate wireless infrastructure in the right-of-way under Wis. Stat. Secs. 182.017(1r) and 196.58(1r), provided that any such local regulation must be reasonable and defensible on public health, safety, and welfare grounds. Currently, there is no state or federal law that requires the City to open up its own infrastructure (i.e., the City's traffic signals, streetlights, conduits, fiber, water towers, etc.) to telecommunications providers.

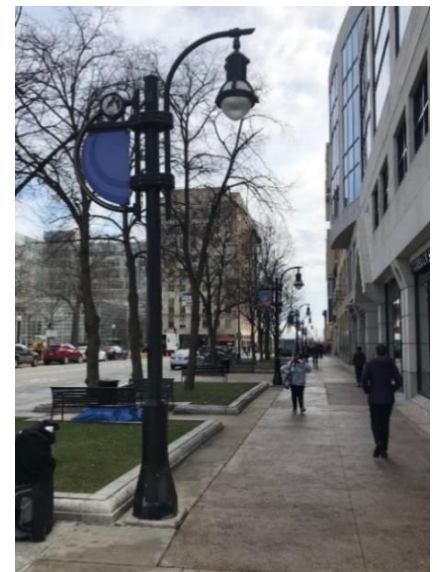
5. Why can't Small Cell equipment be placed on current poles?

There are a variety of existing poles located throughout the City of Madison. There are existing utility poles used to support existing overhead utility lines, and these poles are owned by the utility companies, most of which are owned by MG&E.

If there are multiple lines attached to the pole, the owner of the pole has separate agreements in place with each company attached. The City of Madison owns street light poles and traffic signal poles located throughout the City.

While it is preferable to attach the new Small Cell equipment on existing poles, space on these poles is limited. Also, the City cannot require that MG&E, or other companies that own poles, allow the equipment to be attached to their poles.

Any new attachments to existing poles must be reviewed closely to ensure that the equipment does not impact the structural integrity of the poles or otherwise jeopardize the safety or function of the existing overhead facilities.



Existing multi-fixture poles. Left: Martin Luther King Jr Blvd. Right: State St. with banner.

The City of Madison is currently reviewing the possibility of attaching Small Cell equipment on City-owned poles. However, this would have implications to ongoing maintenance of the poles, such as how to handle repairs if/when a pole is damaged.

Also, a review of potential impacts from the initial installation of the equipment would be necessary including a structural analysis report to determine if the existing pole/base is capable of supporting the Small Cell equipment.

The wiring for the streetlights and traffic signals is currently routed through the interior of the pole and underground through the base of the pole; any new equipment mounted on the pole would require its own wiring. For most pole locations, the applicant will need to remove and replace the existing pole and base with a new combination street light antenna pole and base.

The City of Madison is also reviewing types of City-owned decorative poles, which will not be eligible for the attachment of Small Cell equipment.

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

Cellular infrastructure can be located on private property, but it necessitates an agreement between the cellular provider and the property owner, and the resulting structure may be subject to zoning and land use restrictions.

Any such license, lease, or easement may take time to negotiate, and providers have no ability to require cellular placement in desirable locations.

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

Each wireless provider has different objectives and may not need the same locations. Each carrier, who owns the right to a spectrum of operating frequency, states that some separation with competing antennas is necessary to avoid signal interference.

However, the ability for multiple carriers to share antennas or poles is coming closer to reality as Small Cell technology continues to evolve. The City is exploring all options to minimize 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?

Currently, the City reviews applications for new poles in the right-of-way under the City's right-of-way occupancy ordinance and ensures that the public's health, safety, and welfare are protected in any such new installation.

In addition, the City is assessing whether, and under what conditions, it could open up its own infrastructure (the City's traffic signals and streetlights) for Small Cell co-location.

9. Can the City limit or standardized Small Cell infrastructure?

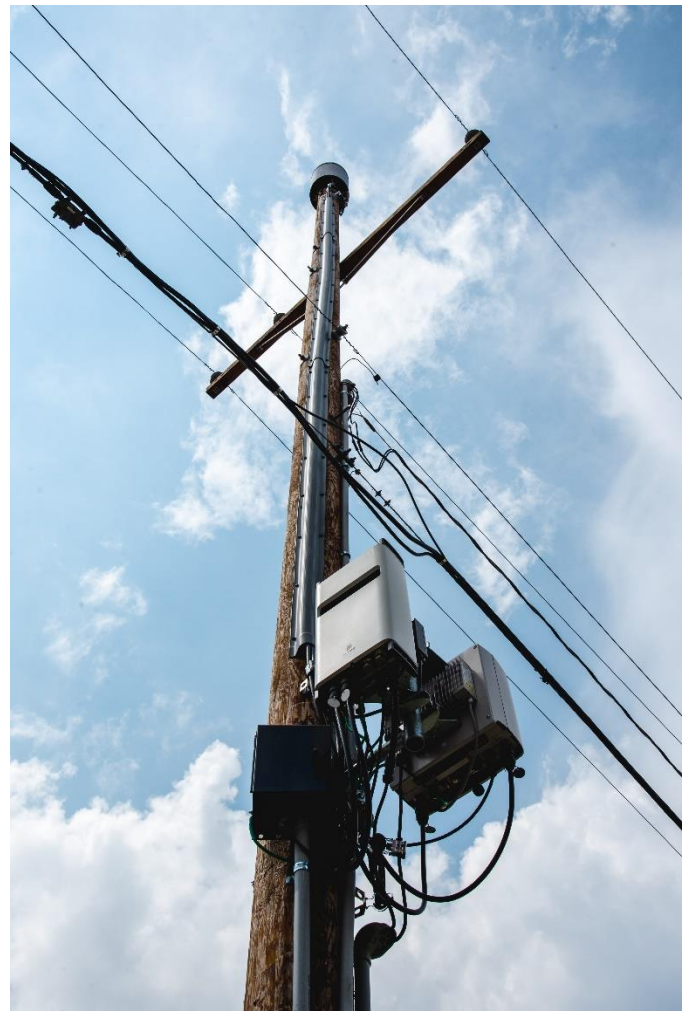
Any regulated telecommunications utility may lawfully place its facilities in the public right-of-way, subject to state and federal laws and regulations as well as City regulations. Federal regulations dictate broad parameters on the size of such facilities, but there is presently no standard Small Cell design on the market. The City cannot prevent the installation of small cell infrastructure in the right-of-way, but the City does have some ability to dictate the size, location, and appearance of these facilities. In addition, the City may be able to exercise additional authority over facilities that are co-located on the City's own infrastructure.

10. Health Concerns

As stated on the FCC website, the Federal Communications Commission (FCC) is required by the National Environmental Policy Act of 1969 to evaluate the effect of FCC-regulated transmitters on human health. The FCC relies on outside non-governmental research (e.g. the National Council on Radiation Protection and Measurements (NCRP)) on human exposure to radio-frequency (RF) electromagnetic fields.

On August 1, 1996, the FCC adopted the NCRP's recommended limits for field strength and power density for transmitters operating at frequencies of 300 kHz to 100 GHz. In addition, specific absorption rate (SAR) limits for devices operating within close proximity were also adopted in FCC-96-326.

However, the purpose of this order was to address the use of cellular telephones and long-term research on Small Cell RF exposure is currently underway by outside agencies and organizations. Contact the FCC's RF Safety Program at rf-safety@fcc.gov or 1-888-225-5322 for more information.



Small Cell Installation in the City of Madison.

11. State & Federal Government Contacts

Contact your representatives about current and upcoming legislature regarding Small Cell facilities.

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	Representative Lisa Subeck <i>Assembly District 78</i>	(608) 266-7521 Rep.Subeck@legis.wisconsin.gov
State Senate	Senator Mark Miller <i>Senate District 16</i>	(608) 266-9170 Sen.Miller@legis.wisconsin.gov
	Senator Fred A. Risser <i>Senate District 26</i>	(608) 266-1627 Sen.Risser@legis.wisconsin.gov
U.S. House	Representative Mark Pocan <i>WI Congressional District 2</i>	Madison Office: (608) 258-9800 Washington, D.C. Office: (202) 225-2906
U.S. Senate	Senator Ron Johnson	Madison Office: (608) 240-9629 Washington, D.C. Office: (202) 224-5323
	Senator Tammy Baldwin	Madison Office: (608) 264-5338 Washington, D.C. Office: (202) 224-5653
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