



# FAQ on Small Wireless Facilities

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This document was produced in coordination with:



**DISCLAIMER**

At the time of this publication the FCC Small Cell Order is in effect. However, there is active litigation going on related to the FCC Small Cell Order which means some of this information is subject to change in the future.

## Background

On January 31, 2017, Federal Communications Commission (“FCC”) Chairman Ajit Pai established a Broadband Deployment Advisory Committee (“BDAC”), which he tasked with making recommendations to the FCC on ways to accelerate the deployment of broadband by reducing or removing regulatory barriers to infrastructure investment. On September 27, 2018, the FCC released a Declaratory Ruling and Third Report and Order (FCC 18-133, identified throughout this document as “Small Cell Order” or “FCC Order”) that significantly limits local authority over small wireless infrastructure deployment and fees for use of the rights of way. Most provisions of the FCC Order took effect January 14, 2019. Under the FCC Order, there are prescribed definitions of small wireless facilities, as well as criteria for aesthetic or design standards. The definitions within the FCC Order reflect that such facilities may not result in human exposure to radiofrequency (“RF”) radiation in excess of applicable standards in the FCC’s rules. Currently, the League of Oregon Cities is disputing the Small Cell Order in the 9<sup>th</sup> Circuit Court along with other local governments and the National Association of Telecommunications Officers and Advisors (NATOA).

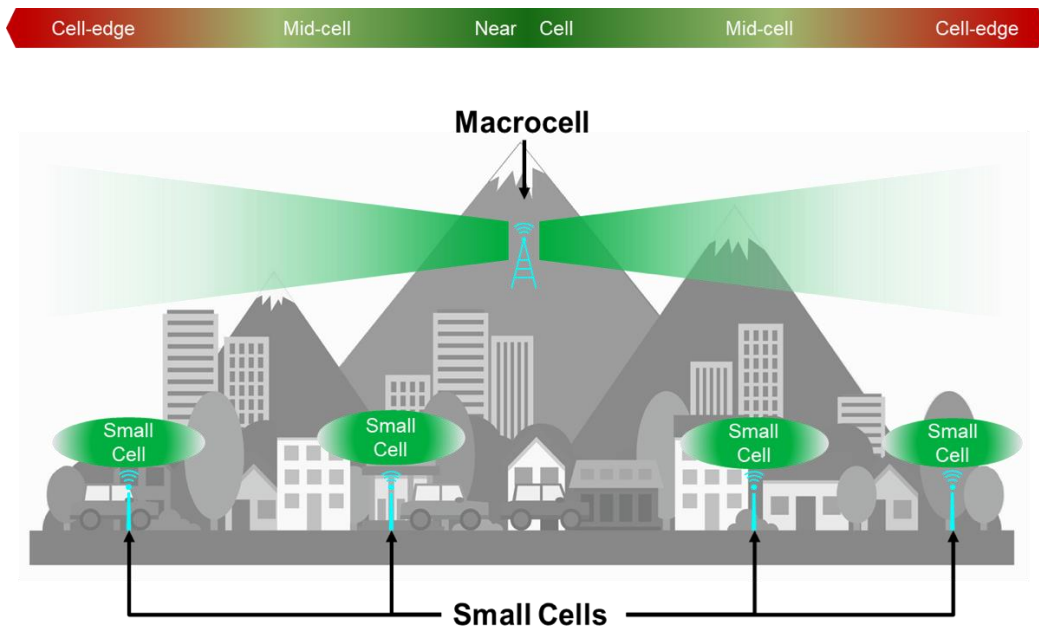
## LOC FAQ on Small Wireless Facilities

As the demand for connectivity increases and the Internet of Things (“IoT”) proliferates with the connection of millions of new smart devices to the internet, cities are facing the reality that to meet the increasing demands of residents and businesses, more wireless facilities and infrastructure needs to be deployed. With that reality, city officials must also reconcile a number of policy, public safety, land-use and right-of-way considerations. As cities navigate this rapidly-changing policy environment and work to reconcile issues from wireless and infrastructure providers and community residents, a number of considerations for the different stakeholders begin to emerge.

To help in this time of change, the League of Oregon Cities, in coordination with many cities, as well as representatives from Verizon, AT&T, and T-Mobile, met and worked diligently from January 2019 to May 2020 to discuss and craft a [model code](#), [model design standards](#), and an informational document relating to small wireless facilities. Note: small wireless facilities are also referred to as small cells. This document serves as that informational document and provides an overview of small cell technology, deployment, and infrastructure. The intended audience of this document is city staff, planning commissioners, elected officials and community members.

## 1. What is a Small Wireless Facility?

Small wireless facilities, also known as small cells, are just what the name implies – they have smaller wireless radios and antennas than macrocell sites (such as the typical wireless cell tower). Small wireless facilities have a range that varies from a few hundred feet to upwards of 1,000 feet, depending on terrain, vegetation, and the radio frequencies used. These lower power facilities primarily add capacity in high-traffic areas, dense urban areas, and suburban communities, where people are using smartphones and other devices, and are not a substitute for macrocell sites. Small wireless facilities can include 4G and 5G antennas and equipment.



Increasing wireless traffic from data usage, particularly video, requires more wireless facilities, similar to how increased vehicle traffic necessitates additional infrastructure. Increasing demand from wireless users is overburdening existing macrocell sites resulting in congestion when too many users try to use the network's capacity at the same time. Small wireless facilities provide much-needed capacity to relieve this congestion.

## 2. 5G - How Did We Get Here?

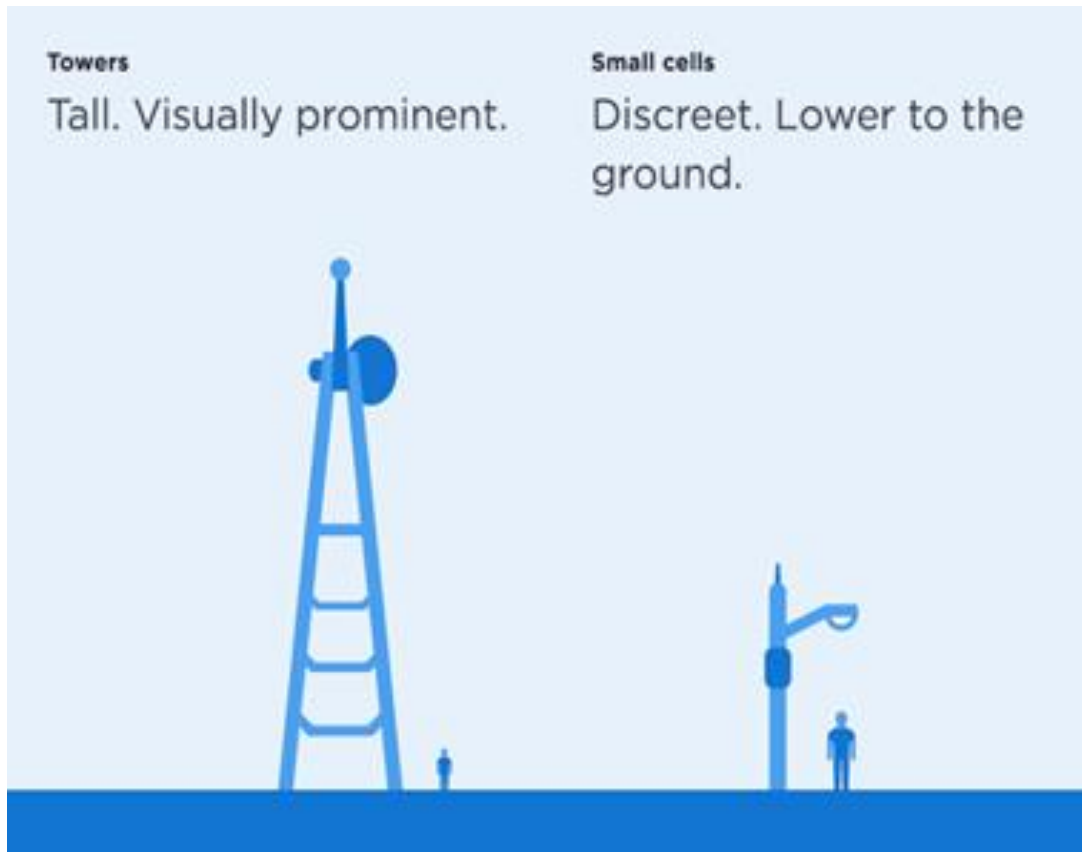
Technology is constantly changing and so are the standards that define wireless communications. The first standard or generation of wireless communication was known as 1G (first generation), which provided analog voice calling on cellular devices. With 2G came digital voice calling and the ability to send texts. 3G added data to the mix along with the first smartphones. 4G (or LTE) is the current standard that allows for faster data transfers, making video calls and other multimedia solutions possible. With each new generation of cellular technology, older standards are eventually phased out. This migration usually takes many years with multiple standards and equipment in use at the same time.

What's the difference between 5G and the other Gs?				
1G	2G	3G	4G	5G
<b>VOICE</b>	<b>SMS</b>	<b>DATA &amp; APPS</b>	<b>VIDEO &amp; SPEED</b>	<b>TRANSFORMATION</b>
We first talk without the wires – on the move, with analog technology.	SMS messaging debuts, bringing us a new way to chat and creating a new language to chat with.	We begin sharing snapshots of our lives, sending images thanks to higher data transfers.	Video calls and new businesses are possible with wireless broadband on our smart devices.	From wireless home broadband AR/VR to mobile gaming and more, 5G will change how we live, learn, work and play.

The 5th Generation technology (5G) is a change in standards for wireless communication to increase capacity, efficiency, responsiveness, and download speeds. This technology is planned to accommodate smart communities, IoT, immersive education, connected cars, remote medicine, virtual reality, remote learning, etc. Carriers deploying 5G may change the type of antennas and wireless equipment currently used to connect all the 5G devices. 5G is expected to be up to 100 times faster and five times more responsive than the previous generation, 4G.

### 3. What Does Small Wireless Technology Look Like?

The current FCC definition of a “small wireless facility” caps the height of the facility and its support structure at 50 feet or 10% of the height of adjacent structures, whichever is greater, and establishes volumetric limits – no more than three cubic feet in volume for each antenna and no more than 28 cubic feet in volume for all other associated equipment. These standards recognize that small wireless facilities may need to differ by provider and situation, but ensure that small wireless facilities are indeed smaller than the cell towers most people are familiar with today, which are known as macro towers.



A typical small wireless facility deployment on a wood utility pole may involve antennas within a cylindrical enclosure, cylindrical omnidirectional antennas, and/or small panel antennas at either the top or middle of the pole to work around the existing electrical wires. Fiber and power lines, enclosed in conduit, connect the antennas to an equipment box, which houses the radios and other equipment. The antennas and equipment configuration may vary from provider to provider. For example, some providers may use panel antennas, which require the ability to tilt or position the antennas to control the direction of the signal; others may use the cantenna, which transmits in a roughly 360 degree pattern without the ability to tilt/position the antennas. Some providers may utilize a single enclosure that houses both the radios and antennas.

5G deployment may require antennas and equipment in addition to those installed for 4G and will be mounted in a variety of configurations. It is important to note that some 5G small wireless antennas cannot operate if covered or painted, but generally come in colors compatible with most installations.

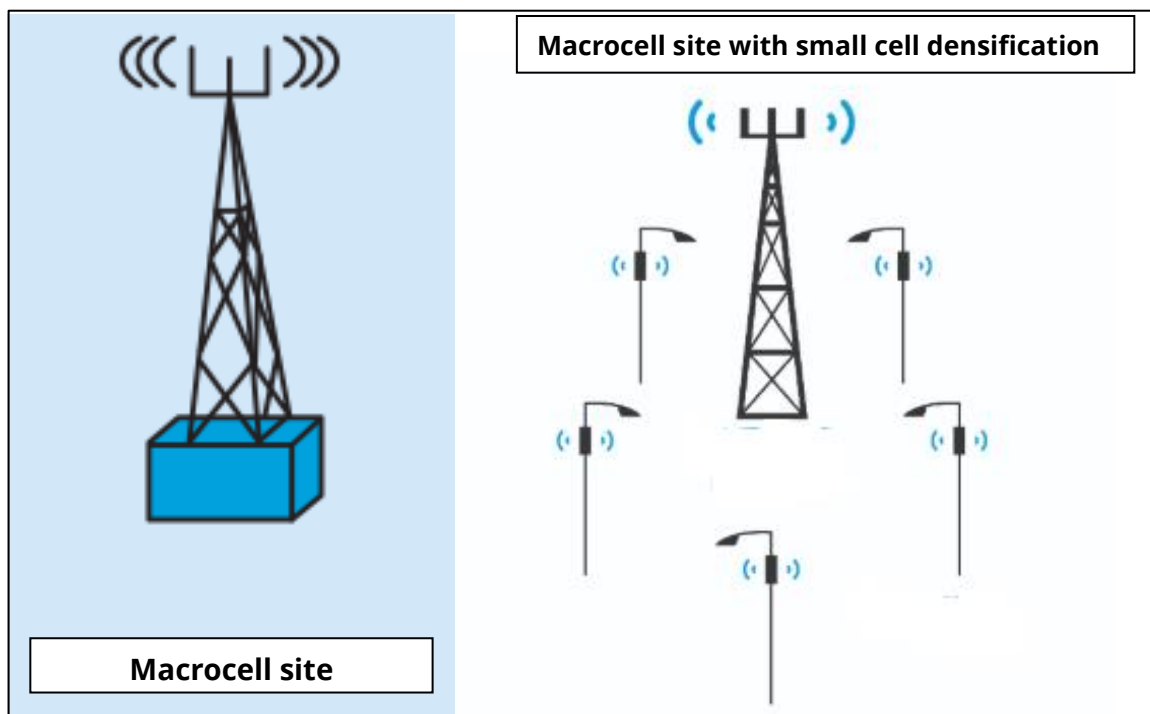
Small wireless facilities can also be placed on light standards or metal stand-alone poles, with antennas located at the top or the side of the pole. Small wireless facility equipment can either be attached to the pole within an enclosure or housed within a larger diameter pole or pole base.

#### 4. As Current Small Wireless Technology Becomes Outdated, What will the Next Generation of Technology Look Like?

From what we currently know, it is probable that small wireless facilities are as small as the technology will be for the foreseeable future. 4G/5G small cell installations will likely continue to be deployed for many years to come, because any new generation of technology may require updates to network equipment, infrastructure and consumer devices.

#### 5. What is “Densification”?

Densification is the process of adding small wireless facilities – much smaller-scale antennas and equipment than traditional macrocell sites. Small wireless facilities can be deployed on street lights and utility poles in the right-of-way. It is noteworthy that small wireless facilities are additive to existing wireless infrastructure.



#### 6. How Does the Carrier Decide Where to Put the Small Wireless Sites? What Factors are Involved and How Big is the Search?

To meet customer needs and expectations, wireless providers must expand and enhance their networks where users live, work, travel and play. Wireless engineers gather information from many sources and analyze the data to determine the best location based on customer needs, terrain, and modeling results. Attaching to existing structures, such as street lights and utility poles, is generally considered first. Network teams perform extensive searches in the area needing improvement to find a location that will meet technical needs while ensuring the potential location complies with applicable laws.

## 7. What is the Likely per Capita Number of Small Wireless Facilities Over Time?

Wireless providers do not build small wireless facilities to meet per capita numbers, but rather to fulfill the data/voice transmission needs of consumers in the area (see also response to question #6 above).

## 8. Will There be Noise Emitted from These Sites?

The sound is expected to be negligible from the ground and facilities are required to comply with applicable noise regulations. Small wireless facilities are generally either passively cooled, so they make no sound, or have very small fans to cool the equipment.

## 9. Why is Investment in Wireless Networks Important?

There are many reasons to invest in wireless networks, including:

- 90% of U.S. households use wireless service. With this increase in demand from users at home and those who work from home comes the need for more facilities to meet the customer needs.
- Over 63% of adults in Oregon households are wireless-only for voice service,<sup>1</sup> exceeding the around 59% of adults in American households that are now wireless-only for voice service.<sup>2</sup>
- Residents need access to 9-1-1 and reverse 9-1-1 and wireless may be their only connection.<sup>3</sup> According to the National Emergency Number Association, 240 million calls are made to 9-1-1 each year, and in many areas of the country, 80% or more are made from wireless devices.<sup>4</sup>
- Wireless technology is constantly innovating and evolving to meet customer needs and demand. Goldman Sachs estimates that in the United States, connected devices could create \$305 billion in annual health system savings from decreased costs and mortality due to the enhanced ability to monitor and communicate with patients managing chronic illnesses.<sup>5</sup>

## 9. How Can Cities Address Health Concerns in Relation to the Regulation of Small Wireless Facilities?

While cities and councils may hear public testimony on health concerns related to RF exposure, the cities cannot base decisions concerning small wireless facilities on those concerns. The federal 1996 Telecommunications Act expressly preempts state and local government regulation of the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of RF emissions to the

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<sup>1</sup> CDC's *Wireless Substitution: Early Release of State-Level Estimates from the National Health Interview Survey*, 2018 (released 12/17/2019)

<sup>2</sup> CDC's *Wireless Substitution: Early Release of Estimates from the National Health Interview Survey*, January-June 2019 (released 05/28/2020)

<sup>3</sup> CTIA, *June 2015*

<sup>4</sup> *National Emergency Number Association (NENA), 2018*

<sup>5</sup> <https://www.ctia.org/the-wireless-industry/infographics-library?topic=17>



extent that such facilities comply with the FCC's regulations concerning such emissions. 47 U.S.C. §332(c)(7)(B)(iv). Although cities may require applicants of the small wireless facilities to affirm compliance with the FCC RF exposure requirements, the FCC remains the exclusive agency for resolving non-compliance.

### **10. Where Can I Go to Find Out More About Health Effects from Small Wireless Facilities?**

The FCC requirements for human exposure to RF electromagnetic fields continue to apply and were derived from the recommendations of two expert organizations, the National Council on Radiation Protection and Measurements (“NCRP”) and the Institute of Electrical and Electronics Engineers (“IEEE”). Both the NCRP exposure criteria and the IEEE standard were developed by expert scientists and engineers after extensive reviews of the scientific literature related to RF biological effects. The RF exposure limits are based on thresholds for known adverse effects, and they incorporate prudent margins of safety. In adopting the current RF exposure guidelines, the FCC consulted with the EPA, FDA, OSHA and NIOSH, and obtained their support for the guidelines that the FCC is using. More information can be found at the FCC’s website at <http://www.fcc.gov/oet/rfsafety/rf-faqs.html>

### **11. Has the FCC Updated its RF Exposure Limits?**

Many local governments have asked the FCC to update their guidelines on RF emissions as technology has advanced and the public continues to be increasingly worried about RF exposure. On December 4, 2019, the FCC released a Resolution of Inquiry, Second Report and Order, Notice of Proposed Rulemaking, and Memorandum of Opinion and Order related to human exposure to RF emissions ([FCC 19-226](#) referred to as the “RF Order”). The FCC maintained in the RF Order that current RF exposure safety standards are sufficient at this time and will remain unchanged. The FCC reached this conclusion because the evidence “does not demonstrate that the science underpinning the current RF exposure limits is outdated or insufficient to protect human safety.” These standards will continue to apply to all wireless devices, including 5G devices and millimeter wave spectrum that some carriers will use to deploy 5G service.

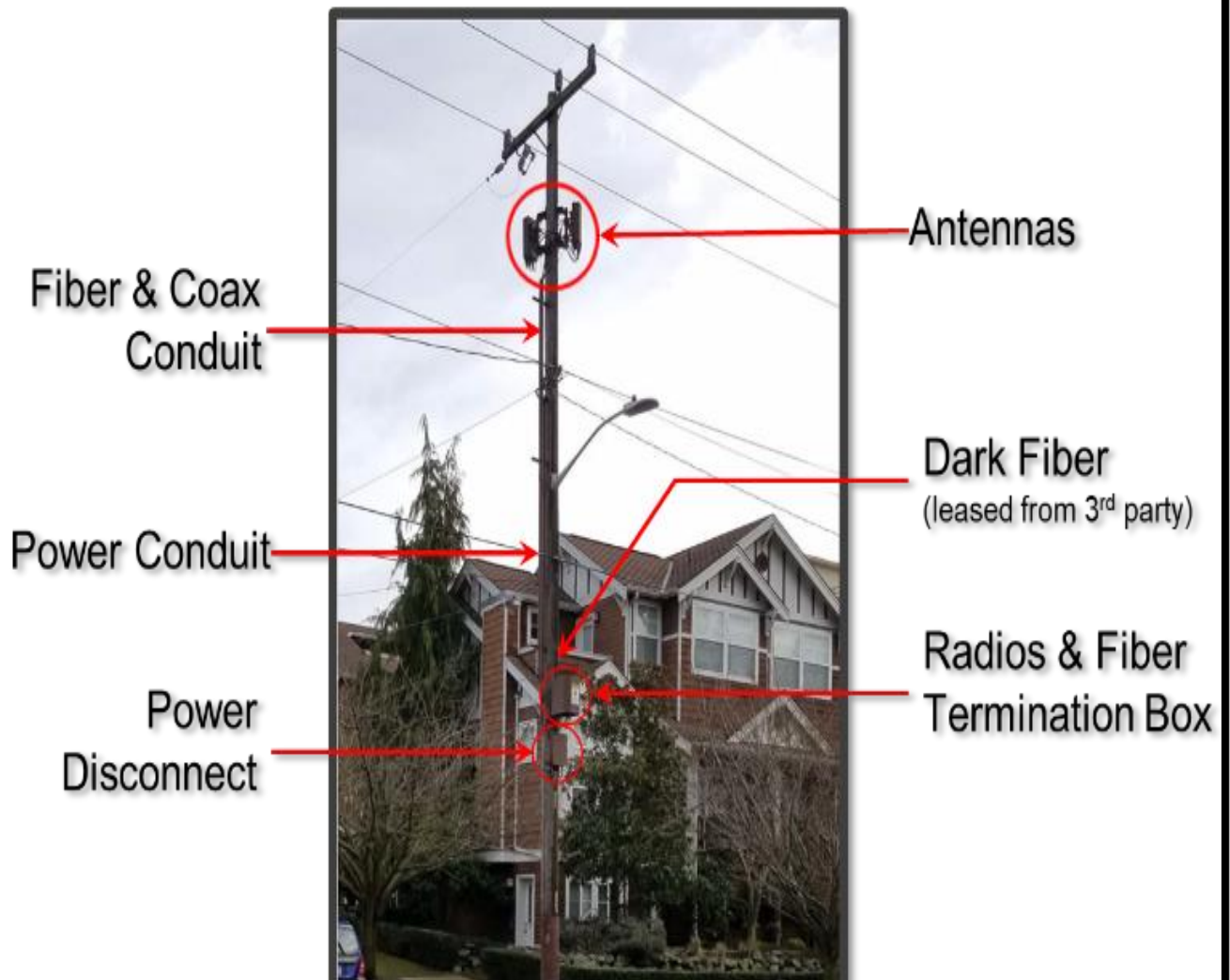
### **12. Will this Site Near My House Affect My Property Value?**

Generally, cities and carriers do not factor in property values in the consideration of the location on these facilities. However, the [National Realtors Association](#), the [Oregon Realtors Association](#), and the [Greater Oregon Chapter of the Appraisal Institute](#) can be consulted on these matters.

## Examples and Further Pictures

*Disclaimer: The carriers have provided several images of actual small cell installations on various types of poles. Estimated pole heights have been provided as a frame of reference. These pictures are intended to be representative of the different types of small cell configurations the providers may deploy, but the exact equipment size, and equipment used, will vary based on the providers frequency and network needs.*

### Small Cell Components



For reference - antennas are at 35 feet, pole height is approximately 41-45 feet.

# Small Cell v. Macrocell Antenna

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# Utility Pole

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For reference - antennas are at 35 feet, pole height is approximately 41-45 feet.

# Light Standard

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# Wireless Only Pole

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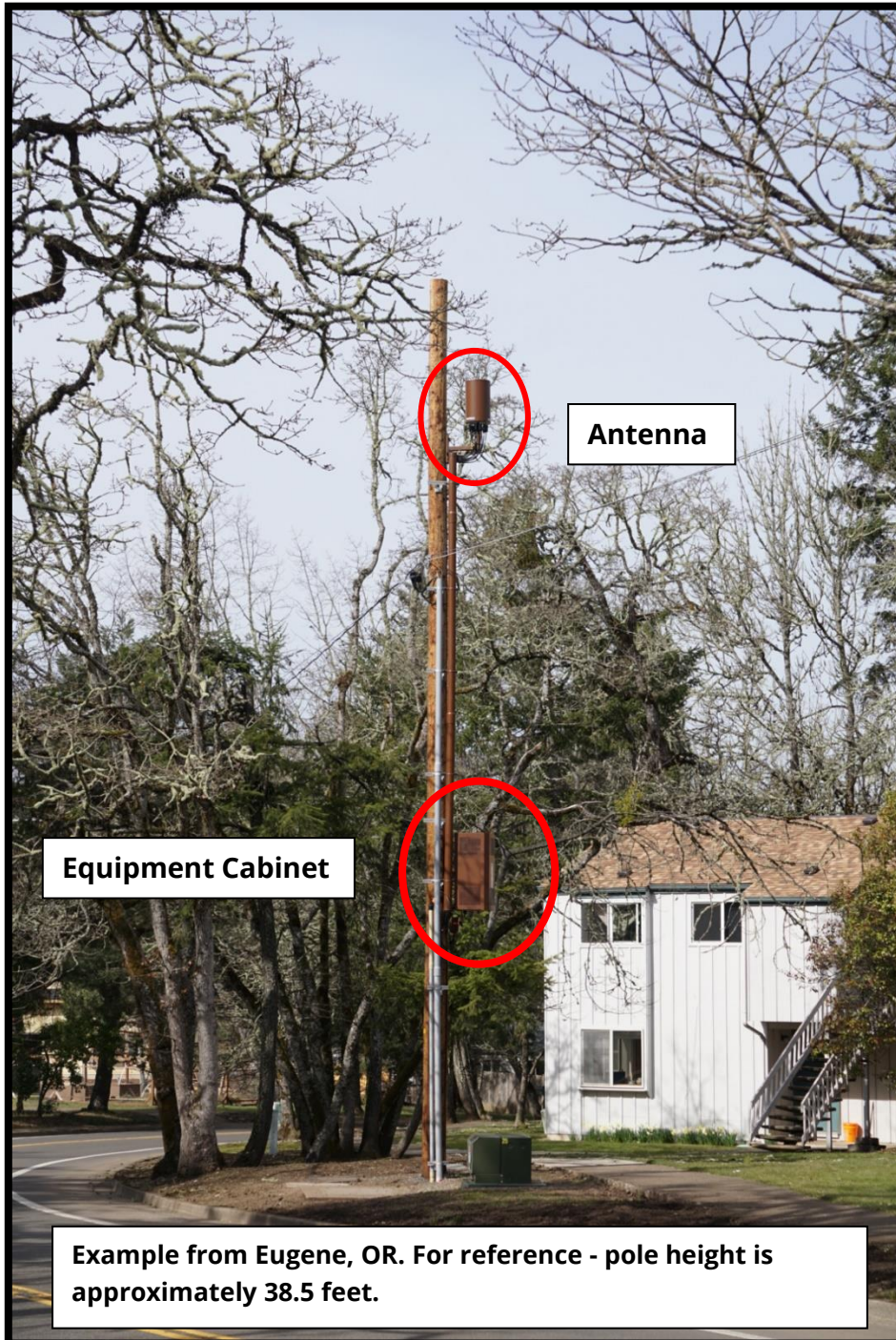
# Strand Mounted Antennas

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# Omni Antennas or Antennas within Canister

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# 4G/5G Installation on a Streetlight

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# Consolidated Equipment Cabinet with Radios and Antennas

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# Small Cell Facility Integrated into A Streetlight Pole

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**Example of a proposed small cell facility integrated into a streetlight pole in Beaverton, OR. For reference - pole height is approximately 30 feet pole.**

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