



Small Cell Wireless Network Technology and Planning: Presentation

Join us for a timely presentation to learn more about latest wireless technology (small cell networks & 5G) and planning from Verizon.

2 : 00 pm – Presentation
3: 00 pm – Q&A

Friday, March 22 2019



verizon✓



Western New York Section and
New York Upstate Chapter of the
American Planning Association

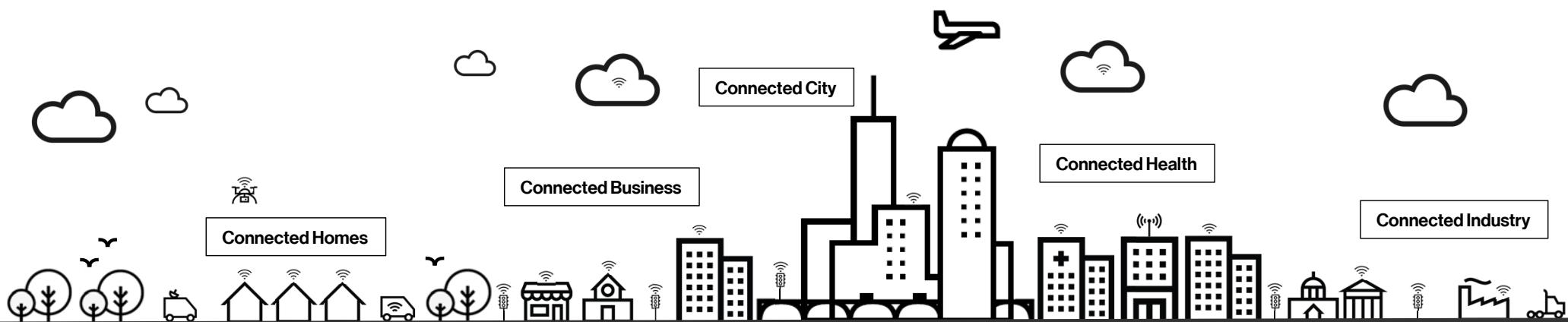
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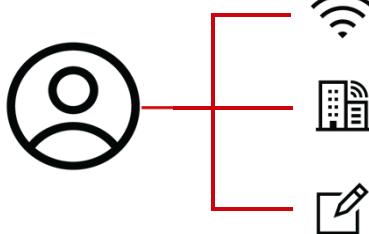
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5G is coming to Upstate NY. How will it impact your community?



Partner with Verizon Wireless

Meet with your dedicated Upstate NY Network Real Estate team to make sure you can answer these timely questions and learn how Verizon can collaborate with you to help prepare your community for **5G**.



What is a small cell and why do we need them?

How will 5G and small cell technology benefit my community today and in the future?

How can we get insights on updating our local code and regulatory framework to comply with the recent FCC order?

- Built on highly connective technologies, **5G** networks are poised to change and transform our lives through revolutionary breakthroughs in digital connectivity, which is why it is often considered as the *4th Industrial Revolution*.
- Although they are complimentary, **5G** networks will depend less on large cell towers, and more on small cells and sensors strategically placed much closer together.
- We know that there are lots of questions about a network that can support more than two million connected devices in a square mile while offering up to 20 times faster download speeds compared to 4G. That's why we would like to meet with you soon to listen, inform and collaborate in a respectful and responsive way.
- Your role is critical in developing and implementing smart policies. We encourage you to start thinking about **5G** now so that your local government and community can take advantage of a network that will offer societal benefits in a myriad of ways.
- We are excited and committed to building a **5G** network that will provide unique experiences and opportunities. We are inviting you to be part of this revolution to join together in rolling out the next generation of wireless technology throughout Upstate NY.



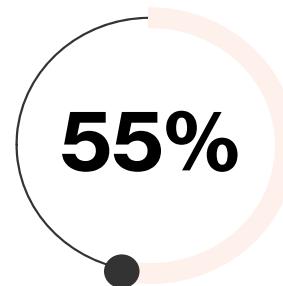
At Verizon, We Don't Wait for the Future, We Build It.

Why are we expanding the wireless network?

More people than ever before rely on wireless connections to manage their lives and businesses.

Verizon is expanding its wireless network to meet the growing demands of today and tomorrow.

But it takes time.



The average North American smartphone user will consume 48 GB of data per month in 2023, up from just 5.2 GB per month in 2016 and 7.1 GB per month in 2017.¹

Of American homes are wireless only.²

In North America, the average household has 13 connected devices with smartphones outnumbering tablets 6 to 1.³

1. Ericsson Mobility Report, November 2017

2. CDC's 2018 Wireless Substitution: Early Release of Estimates From the National Health Interview Survey, January-July, 2018

3. IHS Market Connected Device Market Monitor: Q1 2016 , June 7, 2016

Staying ahead of demand.

A wireless network is like a highway system...



More wireless traffic needs more wireless facilities just like more vehicle traffic needs more lanes.

- Many wireless users share each cell site and congestion may result when too many try to use it at the same time.
- Wireless coverage may already exist in an area, but with data usage growth increasing exponentially each year, **more capacity is needed**.
- To meet capacity demands, **we need to add more wireless antennas closer to users and closer to other cell sites to provide the reliable service customers have come to expect from Verizon.**

In the US, mobile data traffic was 1.3 Exabytes per month in 2016, the equivalent of 334 million DVDs each month or 3,687 million text messages each second.*

*Cisco VNI Mobile Forecast Highlights, 2016-2021, February 2017

Wireless facilities and property values.

Cell service in and around the home has emerged as a critical factor in home-buying decisions.



National studies demonstrate that most home buyers value good cell service over many other factors including the proximity of schools when purchasing a home.

75%

83%

90%

More than 75% of prospective home buyers said a **good cellular connection was important** to them.¹

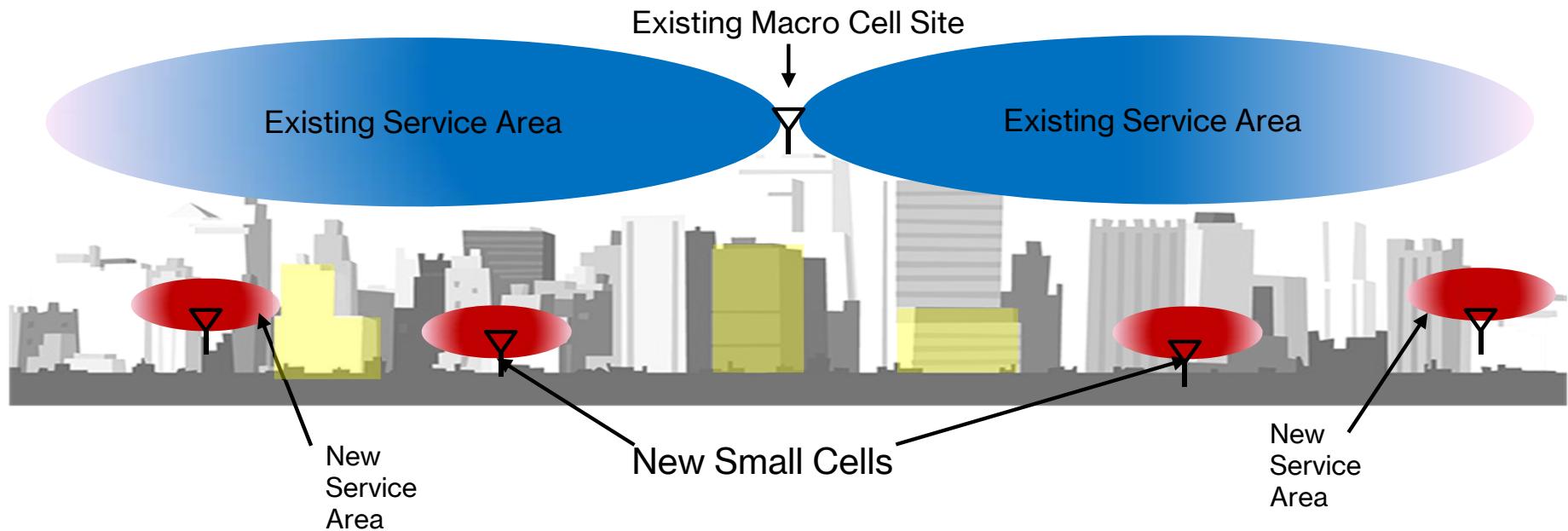
The same study showed that **83% of Millennials** (those born between 1982 and 2004) said cell service was the most important fact in purchasing a home.

90% of U.S. households use wireless service. Citizens need access to 911 and reverse 911 and wireless may be their only connection.²

1. RootMetrics/Money, The Surprising Thing Home Buyers Care About More than Schools, June 2, 2015
2. CTIA, June 2015

Heterogeneous Network (HetNet)

- Macro Cells
- In-Building Systems
- Small Cells



The Vision of 5G

10,000x more traffic **>10 Gbps** peak data rates **100 Mbps** whenever needed



High speed. Extreme Mobile Broadband



Virtual
Presence

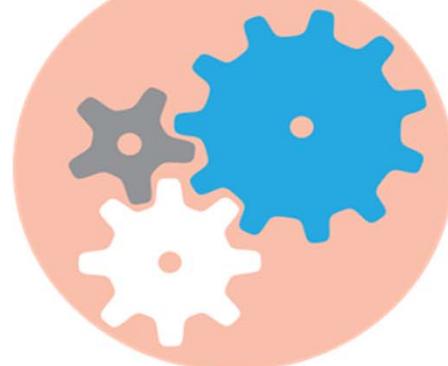


Real Time
Work In
Cloud



Virtual
Gaming

Instant action **<1 ms** radio latency **Ultra** reliability



Low latency. Critical Machine Communications



Factory
Automation



Real Time
Remote Control



Autonomous
Delivery

10 years on battery **Ultra** low cost **10-100x** more devices



Massive scale. Massive IoT Communications



Smart
Grids



Infrastructure
Management



Smart
Wearables

The Fourth Industrial Revolution

Massive Machine Type Communications



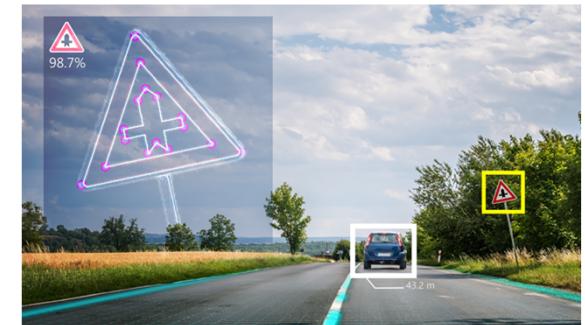
Massive IoT

Ultra Reliable Low Latency Communications



Autonomous Navigation

Edge Computing



Computer Vision

5G Applications for your Community

The most realistic and immediate 5G applications for your community are:



Wireless and Fixed Broadband:

1. This will be an **alternative** to the existing Cable and Fiber ISP's
2. 5G will radically improve the **bandwidth, capacity and reliability** of mobile broadband
3. Mobile and Fixed data **speeds over 1 Gbps and up to 20 Gbps**
4. Downloading and streaming Ultra HD videos and movies
5. Live Broadcasting/Conferencing
6. Improved service delivery capabilities



Smart City: Smart lighting, traffic control, public safety surveillance, smart parking meters



Retail: Inventory management, smart displays, shelf monitoring, traffic tracking



Smart Home: Intrusion detection, energy management, appliance control, smart metering



Health: Remote diagnostic, remote robotic surgery, health monitoring, fall detection



Transportation: Autonomous driving cars, vehicle diagnostics, drone monitoring



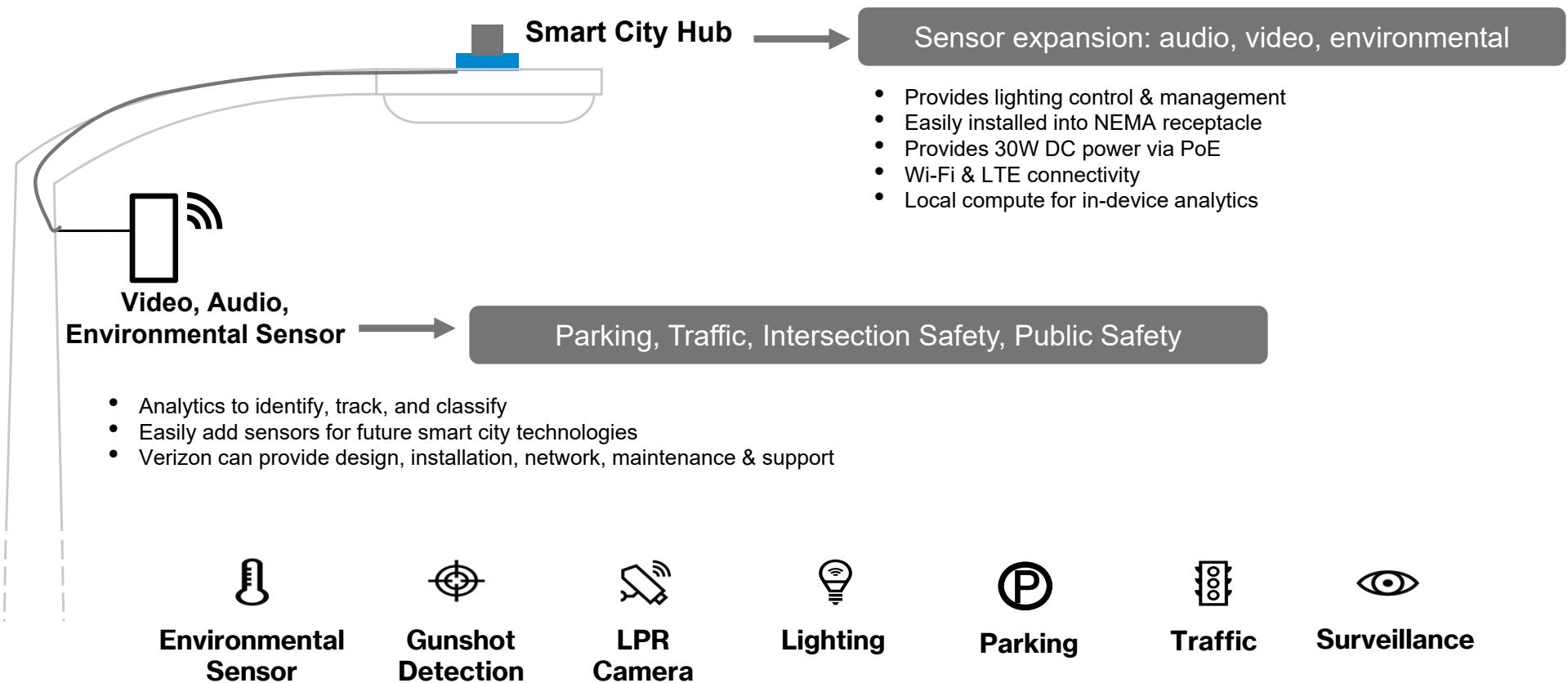
Asset Management: Fleet tracking, container tracking, temperature monitoring, package tracking



Internet of Things (IoT): Connected everything, support for 1 million connected devices per km²

At Verizon, We Don't Wait for the Future, We Build It

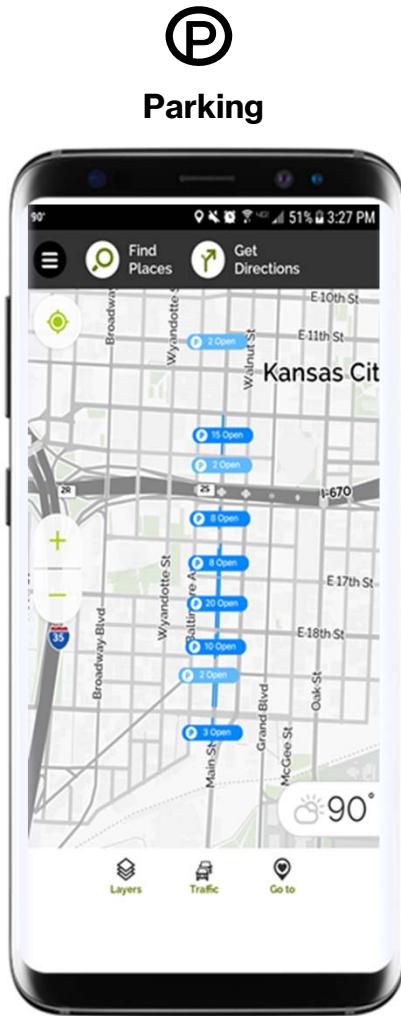
Smart City Applications: Light Pole as a Sensor Hub



Computer Vision as a Multipurpose Sensor

Parking Optimization

- Enables drivers to find parking easier and faster
- Increases parking revenue
- Enhances parking enforcement by identifying parking violations
- Reduce traffic & carbon emissions



Existing Smart Community Engagements



Annapolis, MD

Asbury Park, NJ

Atlanta, GA

Austin, TX

Bellevue, WA

Brea, CA

Brunswick, GA

Boston, MA

Camarillo, CA

Carlsbad, CA

Conyers, GA

Dearborn, MI

Denver, CO

Elizabeth, NJ

Freemont, CA

Houston, TX

Irondale, AL

Kansas City, KS

Lancaster, CA

Lithonia, GA

Los Angeles, CA

Marietta, GA

Milpitas, CA

Maui, HI

New Rochelle, NY

Newark, NJ

Ontario, CA

Orange County, CA

Round Rock, TX

Sacramento, CA

San Diego, CA

San Jose, CA

Sedona, AZ

Spokane, WA

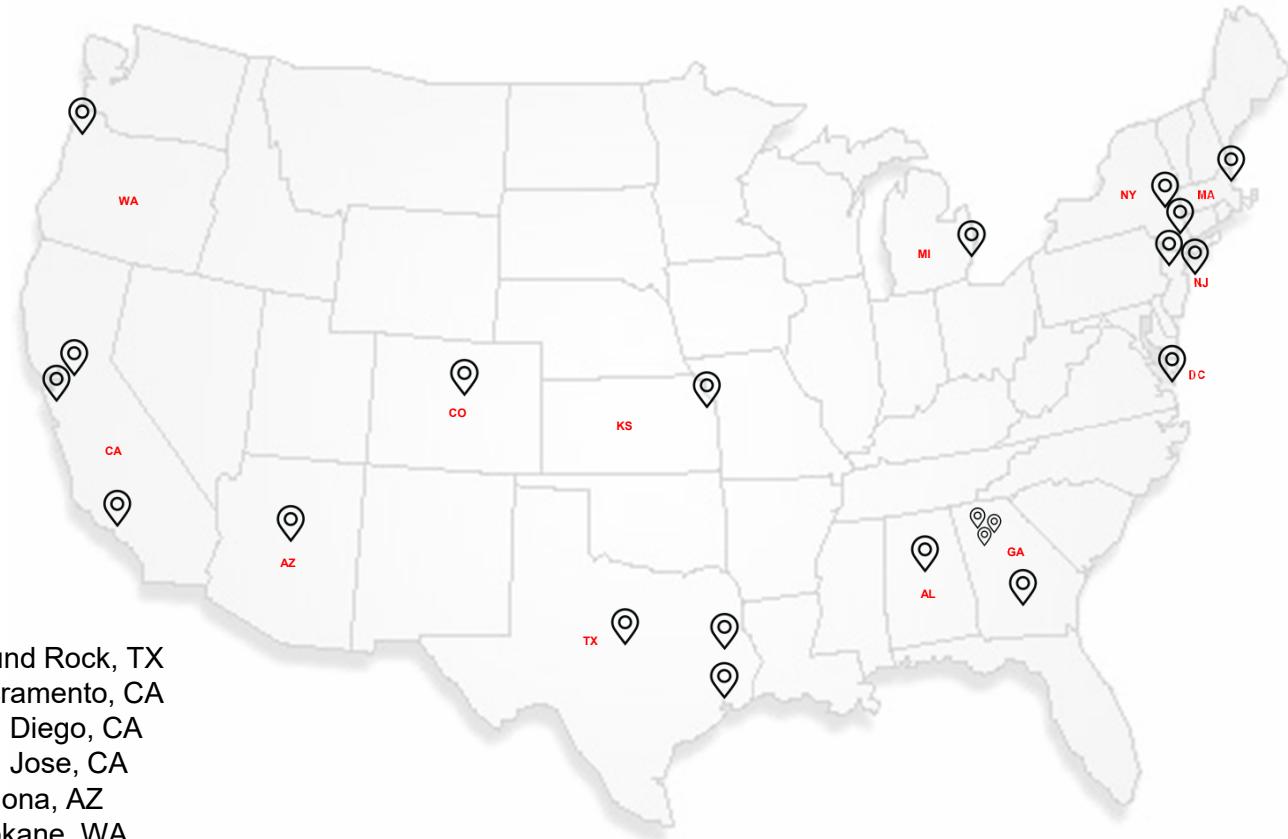
Sacramento, CA

Silver Spring, MD

Tyler, TX

Washington, D.C.

Westfield, NJ



[Discover Smart Communities](#)

Typical Small Cell (4G) Installation Examples

Fairport, NY



Rochester, NY



Washington, DC



Small Cell to Utility Equipment Comparison



5G Installation Examples

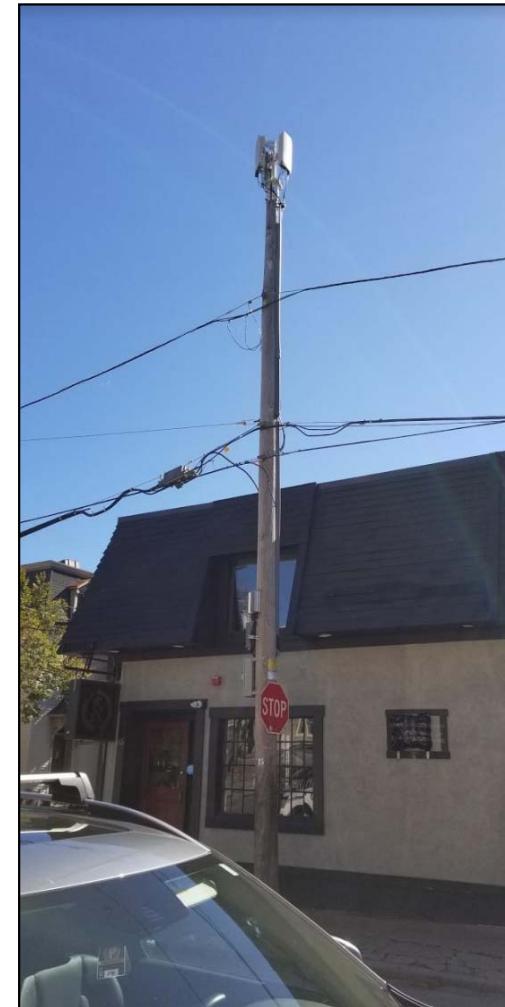
**5G Colocation
on 4G Small Cell**



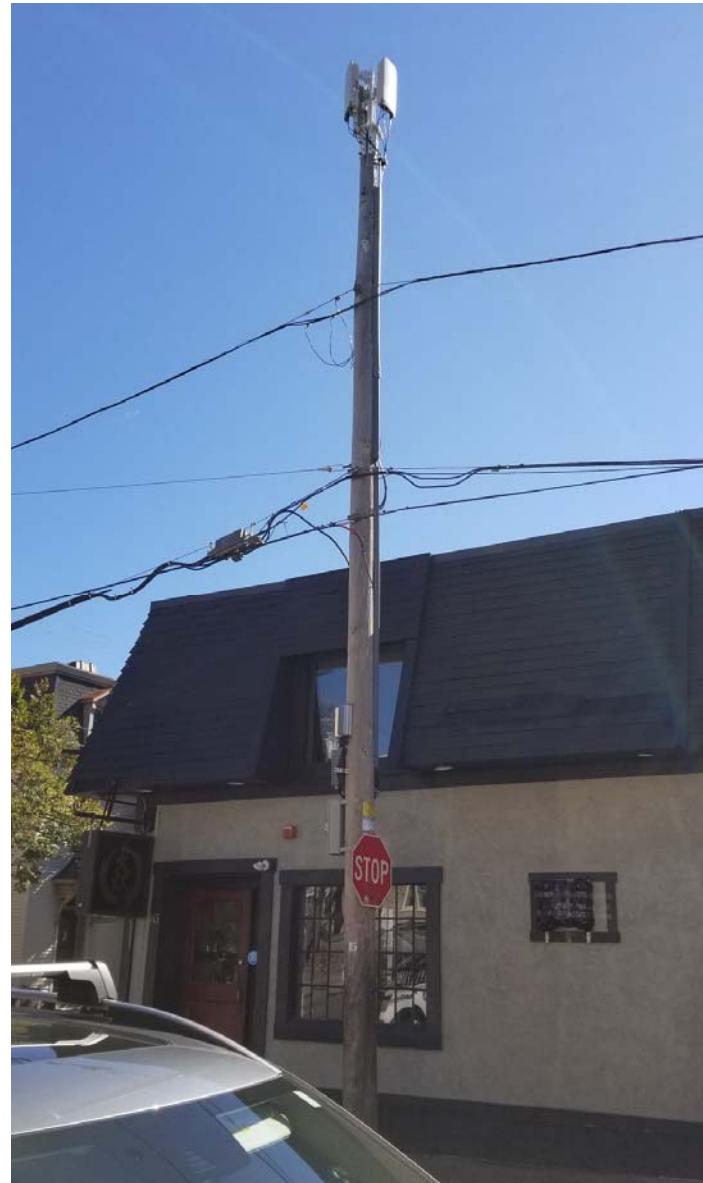
5G Small Cell



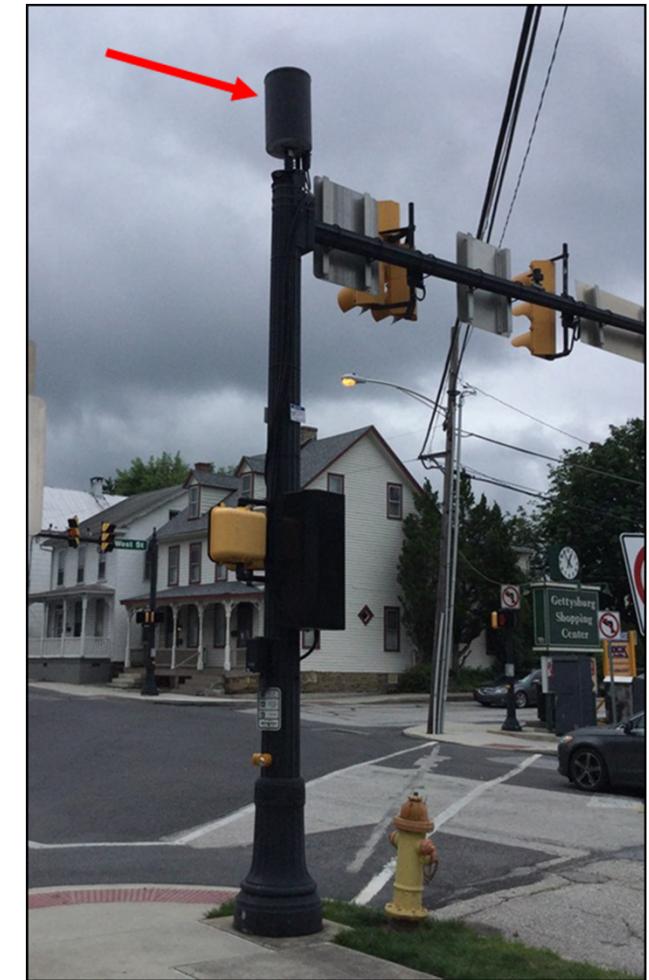
5G Small Cell



5G Installation Components



Signal Pole Options



Verizon Smart Poles

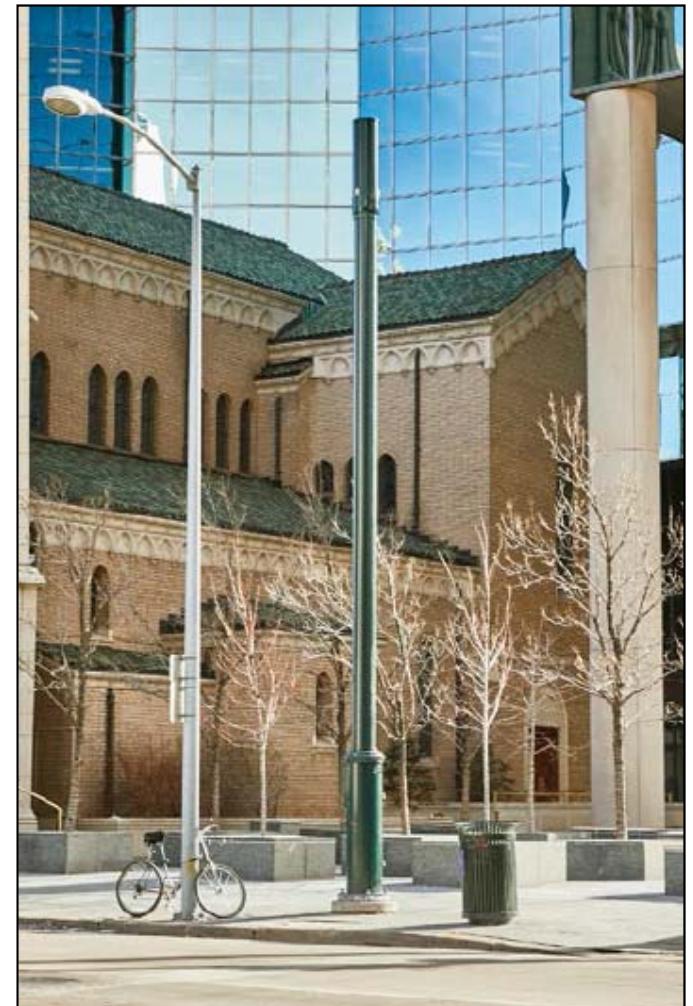
4G Smart Pole



4G Smart Pole



4G Smart Pole



Health and Safety

Wireless technology, equipment and network operations are highly regulated.



According to the FCC, measurements made near a typical 40 foot cell site have shown that ground-level power densities are **1,000 times less** than the FCC's limits for safe exposure.

FCC guidelines for operating wireless networks are based on the recommendations of:

- The Environmental Protection Agency (EPA)
- The Food and Drug Administration (FDA)
- The National Institute for Occupational Safety and Health (NIOSH)
- The Occupational Safety and Health Administration (OSHA)
- The Institute of Electrical and Electronics Engineers (IEEE)
- The National Council on Radiation Protection and Measurements (NCRP)



Health and safety organizations world-wide have studied potential health effects of radio frequency (RF) emissions for decades, and studies continue.



More information can be found through these organizations:

Federal Communications Commission Radio Frequency Safety Program:

http://wireless.fcc.gov/siting/FCC_LSGAC_RF_Guide.pdf

<http://www.fcc.gov/oet/rfsafety/>

Food & Drug Administration "Cell phone facts":

<http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/HomeBusinessandEntertainment/CellPhones/ucm116282.htm>

World Health Organization:

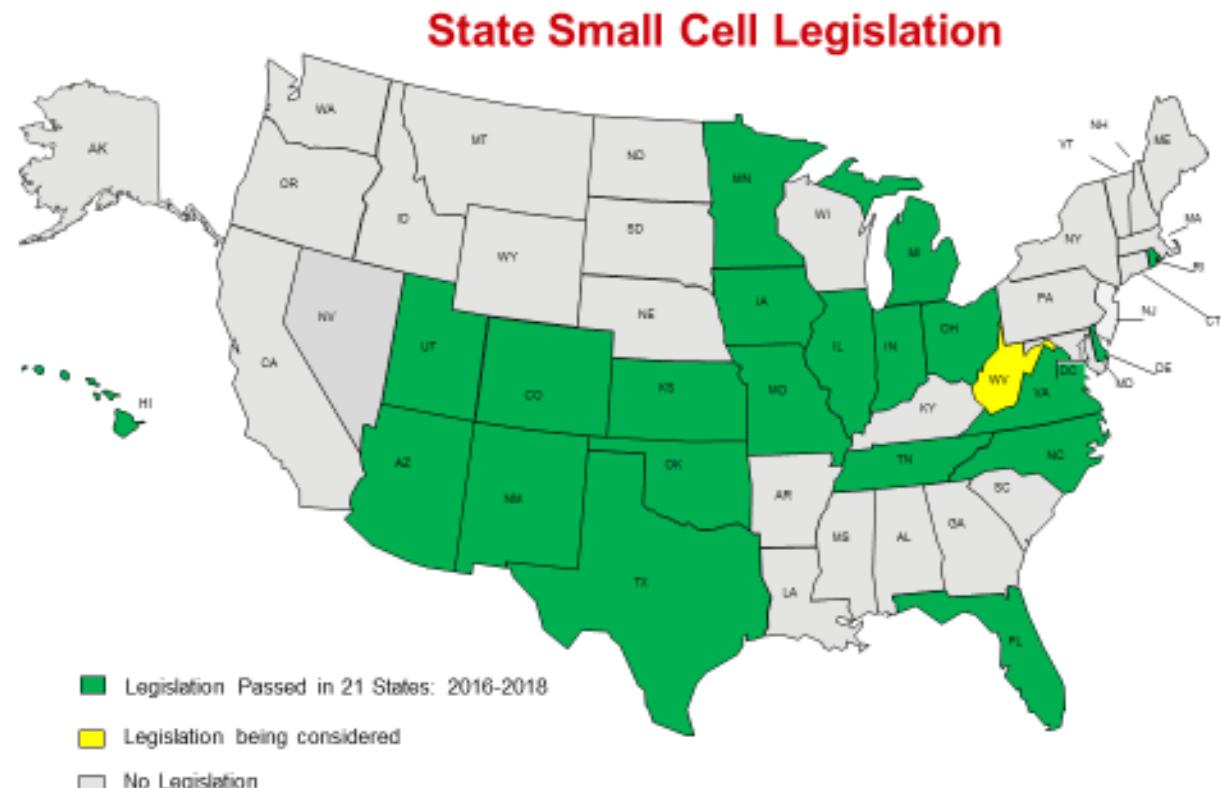
<http://www.who.int/peh-emf/publications/facts/fs304/en/>

American Cancer Society

<http://www.cancer.org/cancer/cancercauses/othercarcinogens/athome/cellular-phone-towers>

Recent Small Wireless Facility Regulatory Framework

- 2017 - 2018 Federal Communications Commission (FCC) Reports and Orders and Declaratory Rulings
- STREAMLINE Small Cell Deployment Act - Streamlining The Rapid Evolution And Modernization of Leading-edge Infrastructure Necessary to Enhance Small Cell Deployment Act (S.3157)
- State Legislation – 21 states



Evolution of Federal Wireless Telecommunications Regulation

- 1910 – Interstate Commerce Commission charter expansion**

Congress saw similarities between interstate transportation of goods (i.e. – railroads and pipelines) and expands ICC regulatory authority to telecommunications and radio.

- 1934 – Communications Act of 1934**

“...to make available, so far as possible, to all the people of the United States... a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges...”

This Act created the FCC as an agent of Congress to oversee and regulate telephone, telegraph and radio communications.

- 1996 – Telecommunications Act of 1996**

“An act to promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage rapid deployment of new telecommunications technologies.”

NPRM and NOI, 32 FCC Rcd 3330 (4)
Accelerating Wireless Broadband Deployment by
Removing Barriers to Infrastructure Investment

47 USC Section 253 (a)

No State or local statute or regulation, or other State or local legal requirement, may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service.

47 USC Section 332 (c) (7) (B) (i)

The regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof - (I) shall not unreasonably discriminate among providers of functionally equivalent services; and (II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.

NPRM and NOI, 32 FCC Rcd 3330 (4)

Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment

47 USC Section 332 (c) (7) (B) (ii)

A State or local government or instrumentality thereof shall act on any request for authorization to place, construct, or modify personal wireless service facilities within a reasonable period of time...

47 USC Section 253 (c)

Nothing in this section affects the authority of a State or local government to manage the public rights-of-way or to require fair and reasonable compensation from telecommunications providers, on a competitively neutral and nondiscriminatory basis, for use of public rights-of-way on a nondiscriminatory basis, if the compensation required is publicly disclosed by such government.

Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment Results...

- **Report and Order – 16 Nov. 2017, 32 FCC Rcd 9760 (11)** “FCC Streamlines Requirements for Utility Pole Replacements”
- **Second Report and Order – 22 March 2017** “FCC Acts to Speed Deployment of Next-Gen Wireless Infrastructure”
- **Third Report and Order and Declaratory Ruling – 2 Aug. 2018, 33 FCC Rcd 7705 (12)** “FCC Speeds Access to Utility Poles to Promote Broadband, 5G Deployment”
- **Declaratory Ruling and Third Report and Order, 9/26/18, 33 FCC Rcd 9088 (14)** “FCC Facilitates Wireless Infrastructure Deployment for 5G”



Small Cell Orders

What they do:

- **Declare that express or defacto moratoria are barred as a prohibition of service.**
- **Allow for “cost recovery” of permitting and annual fees with presumptively reasonable limits.**
- **Adopt new “shot clocks” of 60 & 90 days.**
- **Declare aesthetic requirements must be reasonable, nondiscriminatory, objective, and disclosed in advance.**



Small Cell Orders

What they don't do:

- Remove local permitting oversight.
- Eliminate municipal permitting, health and safety code requirements or reasonable design standards.
- Allow wireless carriers to deploy without municipal input.
- Allow siting of macro towers under small cell standards.
- Require municipalities to subsidize private investment. Municipalities are allowed to charge more than the “presumptively reasonable” rates if they can demonstrate higher costs.

FCC Wireless Infrastructure Orders – Where are we Now?

- **January 10, 2019 - US Court of Appeals for the Tenth Circuit denied motion for Stay.**
- ***City of San Jose v FCC* transferred to Court of Appeals for the Ninth Circuit.**
- **Federal Law as of January 14, 2019. See 47 CFR Subpart U.**

How Can My Municipality Be Small Cell / 5G-Ready?

- ✓ Become familiar with the 2018 **FCC Infrastructure Orders**
- ✓ How would my current **Code** address Small Wireless Facilities? Would it meet the requirements of the 2018 FCC Infrastructure Orders and new Federal Regulations? Is a Code revision necessary?
- ✓ How would my existing permit process accommodate Small Wireless Facilities within the public ROW? Is a new **Small Wireless Facility Permit or ROW License Agreement** necessary?
- ✓ Are **town assets**, such as utility poles or existing buried fiber, electronically documented?
- ✓ What next-generation **technology services and applications** would benefit my community?
- ✓ Developing the required infrastructure will be a joint effort. Are you currently **partnering with wireless providers** that are a spectrum licensee in your community to transmit 5G services?

QUESTIONS and DISCUSSION



Thank you

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