
Small Cell Wireless Network Technology and Planning

**Onondaga County Planning
Federation
March 7, 2019**



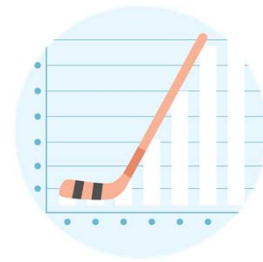
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Why are we expanding the wireless network?

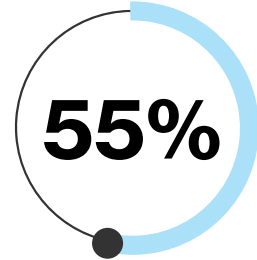
More people than ever before rely on wireless connections to manage their lives and businesses.

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

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%

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

83%

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%

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

Building a wireless network you can rely on in a crisis.

The reliability of your cell phone is never more important than when crisis strikes. That's when a simple call or text message can make the difference between life and death.

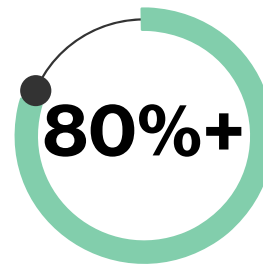


We build reliability into every aspect of our wireless network to keep customers connected when you need it most.

Reliability starts when we choose the safest, most secure locations for our wireless equipment. The likelihood of earthquakes, and risk from wildfires, mudslides, floods, hurricanes and more are all considered.

When disaster strikes, we coordinate with first responders and can mobilize charging stations, special equipment, emergency vehicles and more to support local, state and federal agencies in all 50 states.

It's who we are.



With over 80% of 9-1-1 calls now coming from cell phones...¹

240 million

911 calls are made annually. In many areas, 80% or more are from wireless devices.¹

1. National Emergency Number Association, Enhancing 9-1-1 Operations With Automated Abandoned Callback & Location Accuracy (Motorola Solutions) (August 23, 2018)
2. National Emergency Number Association, 9-1-1 Statistics (January 7, 2019)

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.

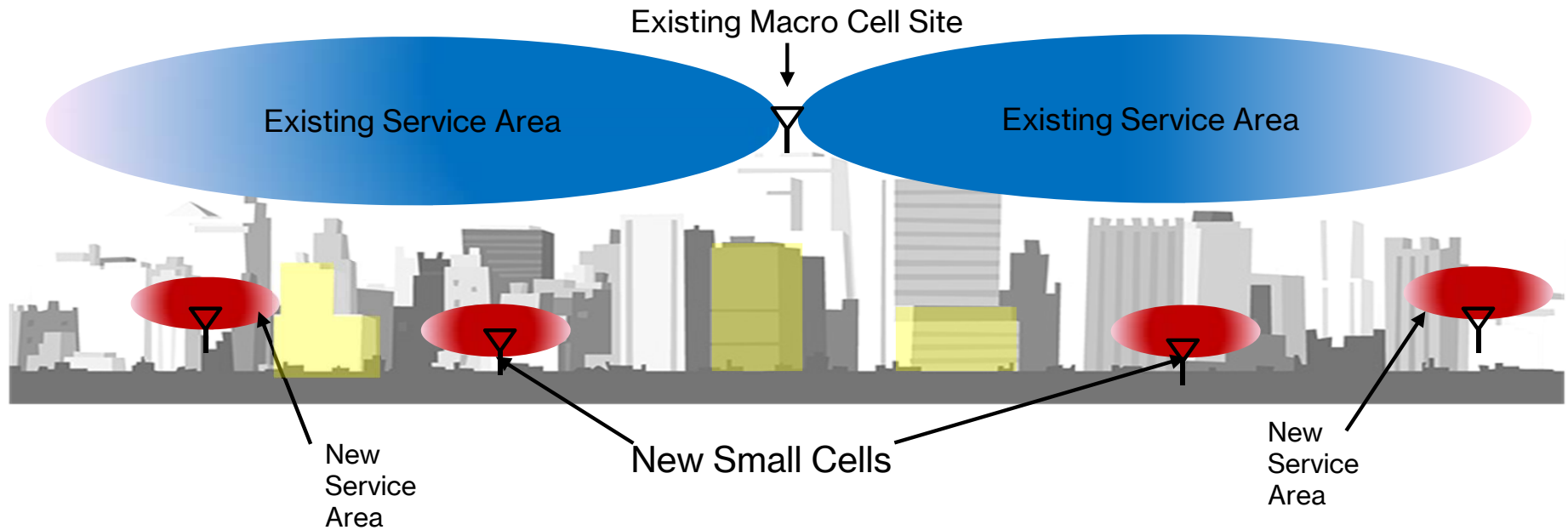
- Many wireless users share each cell site and congestion may result when too many try to use it at the same time.
- Wireless coverage may already exist in an area, but with data usage growth increasing exponentially each year, more capacity is needed.
- To meet capacity demands, we need to add more 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

Heterogeneous Network (HetNet)

- Macro Cells
- In-Building Systems
- Small Cells



The Vision of 5G

>10 Gbps
peak data rates

10,000x
more traffic

100 Mbps
whenever needed



High speed.
Extreme Mobile Broadband



Virtual Presence



Real Time Work In Cloud

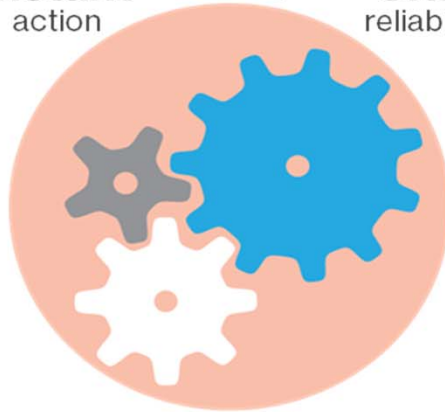


Virtual Gaming

<1 ms
radio latency

Instant
action

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

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

Future 5G applications will include the following:



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

The Fourth Industrial Revolution

Massive Machine Type Communications



Massive IoT

Ultra Reliable Low Latency Communications



Autonomous Navigation

Edge Computing



Computer Vision

Small Cell to Utility Equipment Comparison



Typical 4G Installation

Existing View



Proposed View



Typical 4G Installations

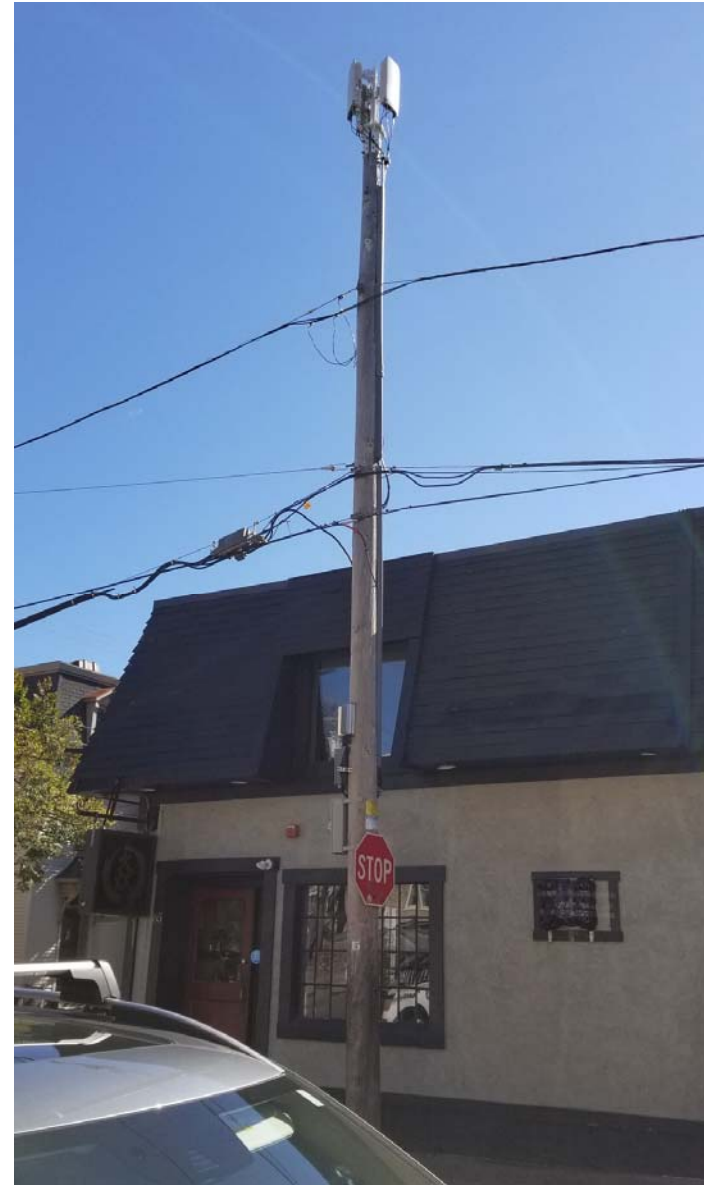


Typical 5G Installation



5G
Antenna/
Radio Units

Power Meter /
Disconnect



Verizon Smart Poles

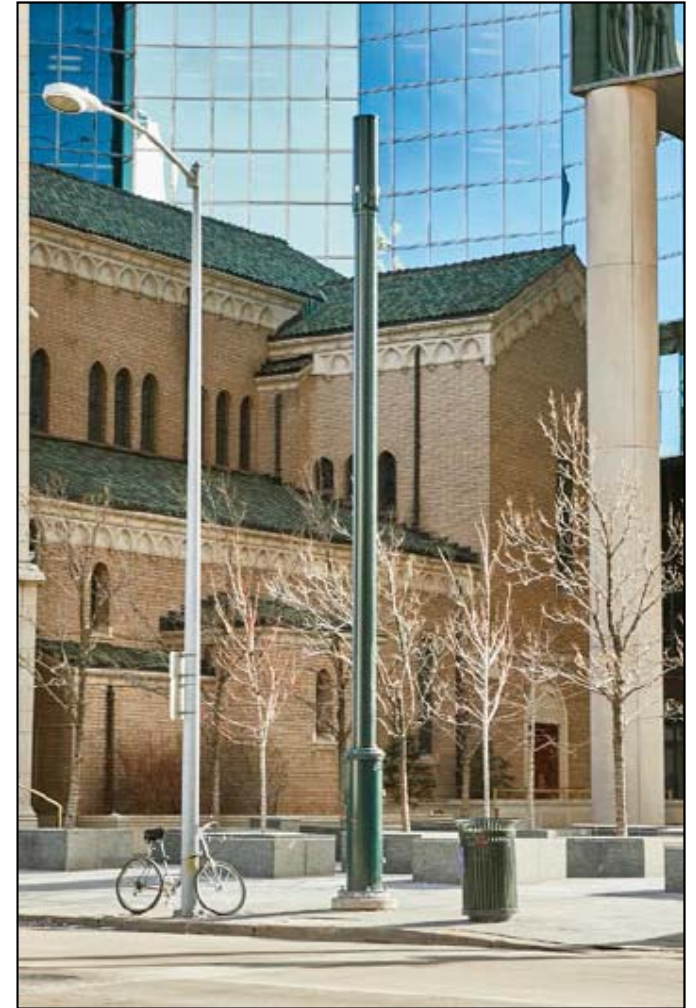
4G Smart Pole



4G Smart Pole



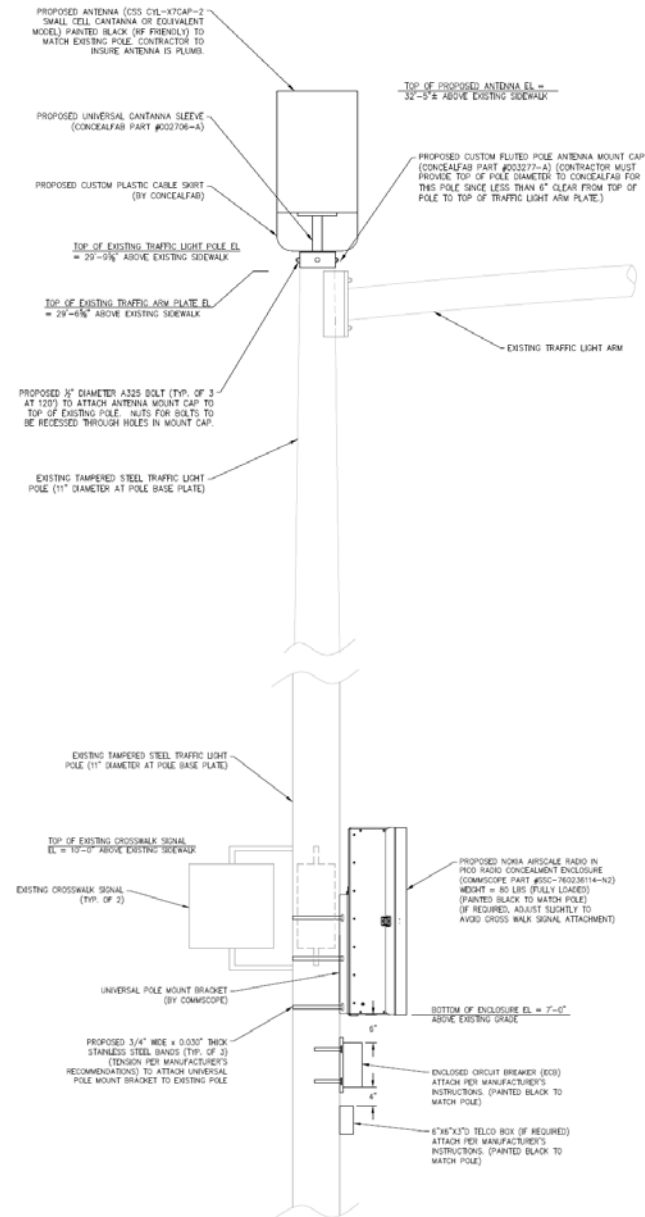
4G Smart Pole



Verizon Small Cell Photographs



Signal Pole Options



Signal Pole Options



Recent Small Wireless Facility Regulatory Trends

- **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***

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 253 (a)

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.

- 47 USC Section 253 (c)

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

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.

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

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 332 (c) (7) (B) (ii)

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”*

FCC Wireless Infrastructure Orders – What they Do...

- Declares that express or defacto moratoria are barred by the Communications Act as a prohibition of service.
- Makes clear that states and localities can recover costs for small cells in the public ROW, but no more than that. Adopts presumptively reasonable fee limits (\$270/attachment/year, \$500 non-recurring fee for up to five facility applications, and \$100 each additional beyond five, and \$1,000 non-recurring fee/new pole application). State/local authorities can demonstrate that higher rates are cost-based and otherwise reasonable.
- New “shot clocks” for state and local governments to process small cell applications. 60-days for small cell collocations and 90-days for new pole construction.
- Aesthetic requirements must be reasonable, nondiscriminatory, objective, and disclosed in advance. The order also finds that requirements to place all small wireless facilities underground are unlawful.

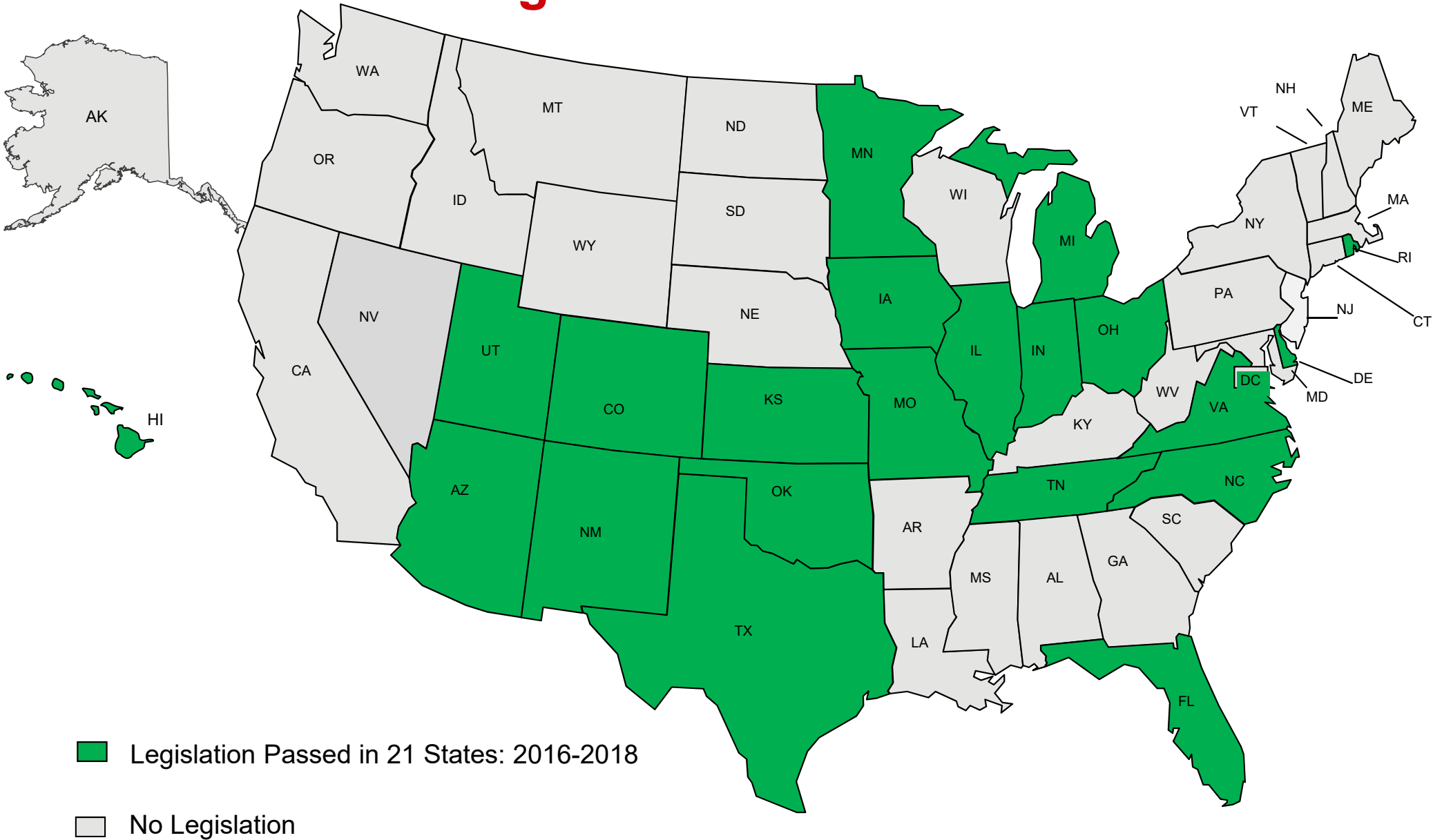
FCC Wireless Infrastructure Orders – What they *Don't Do...*

- Remove local oversight over the permitting process. Municipalities will continue to have the right to deny an application that does not meet objective requirements.
- Eliminate municipal requirements for building, electrical and public way use permits, as well as health and safety codes and reasonable and non-discriminatory aesthetic and design standards.
- Allow wireless carriers to place small cell technology without input from a municipality.
- Allow for siting of macro cells or towers (above a specified height and volume limits) under standards designed for small wireless facilities.
- Require municipalities to subsidize private investment. Under the FCC guidelines, municipalities are allowed to charge “presumptively reasonable” rates and to make a case for even higher 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.

State Small Cell Legislation



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?

Thank you

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Thank you.

QUESTIONS and DISCUSSION