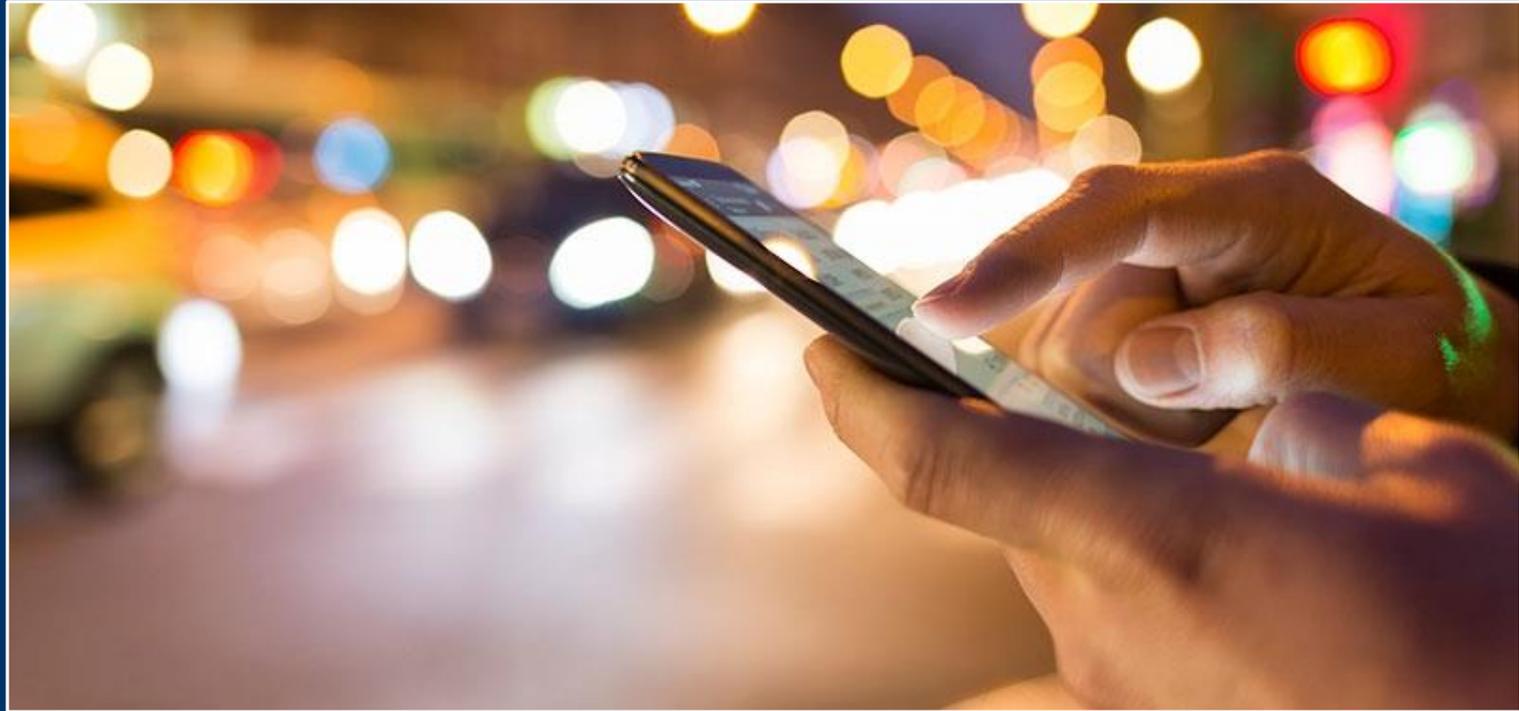


Wireless Telecomm Initiative



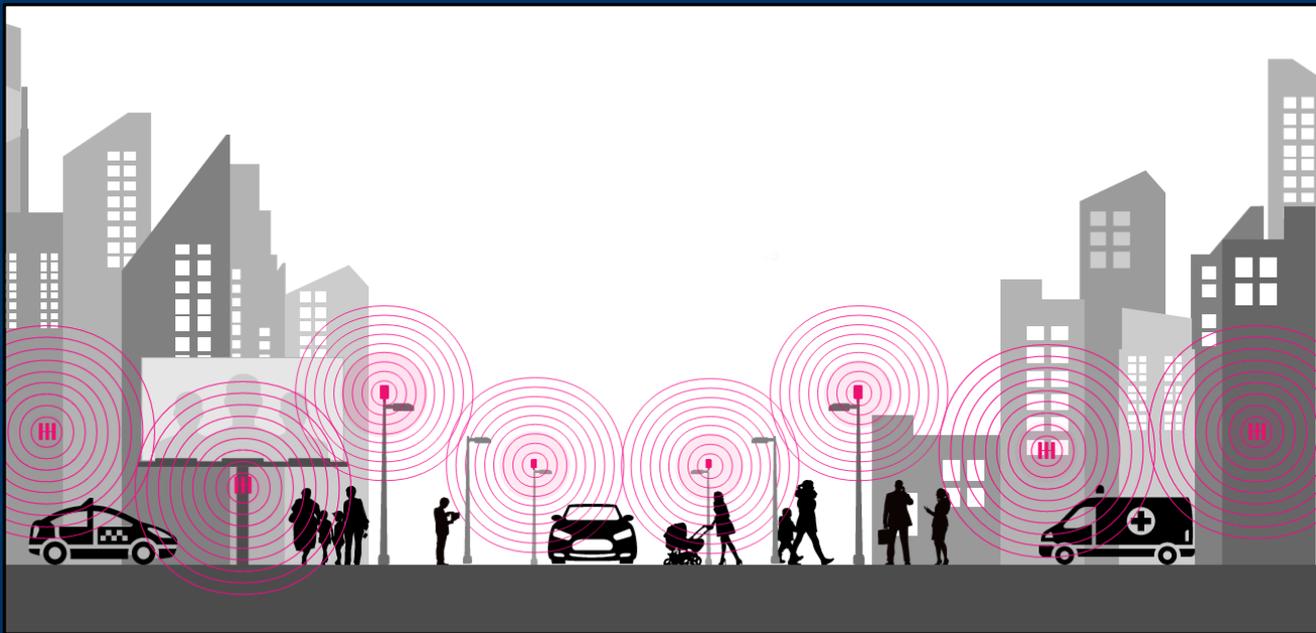
Public Information Meeting
Phil Mason, AICP
Planning Manager, Development Services
September 21, 2017



TOWN OF CHAPEL HILL

Purpose

- To position the Town for the deployment of essential new wireless infrastructure and
- Minimize impacts on neighborhoods and the community.



AGENDA

- 1) CityScape Consulting Presentation
- 2) Poll
- 3) Next Steps
- 4) Questions



TOWN OF CHAPEL HILL

Wireless Telecommunications Initiative

Initial Public Outreach



CityScape Consultants, Inc.

Susan Rabold, Project Manager

Elizabeth Herington-Smith, Government Relations Manager

September 21, 2017 Chapel Hill Public Library, 7pm

CityScape Consultants, Inc.

- Company started in Florida in 1997
- Offices in Florida, Georgia, North Carolina and Washington, DC
- Exclusively serve government clientele with unbiased information
- Company goals and objectives consistent with Federal Statutory, Decisional and Regulatory Law
- Assists local government with:
 - Wireless Telecommunications Master Planning
 - Site Application Engineering Review
 - Ordinance Review
 - Leasing and Development of Public Land



CityScape Consultants, Inc.

Management Team

- Richard Edwards, President, Partner, Engineer
- Anthony Lepore, Esq., Vice President, Partner
- Kay Miles, Vice President, Partner
- Jonathan Edwards, P.E., Principal Engineer
- Susan Rabold, Project Manager
- Elizabeth Herington-Smith, Government Relations/Marketing Manager



Introduction to Wireless Telecommunications

Personal Wireless Service Facilities (PWSF)

Infrastructure initially built for cellular phones now upgraded and constructed for cellular phones, tablets and smart devices



Wireless Telecommunications History



1G



2G & 3G

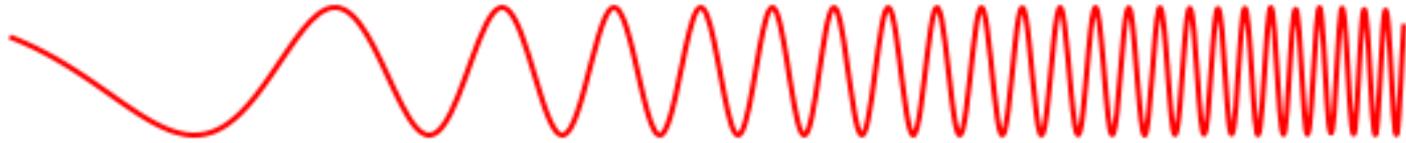


4G

- 1G service provided voice calls only.
- 2G service included voice, texting and data.
- 3G service offered in early 2000's improved data speeds.
- iPhone in 2007 offers thousands of applications.
- 4G service on AWS and LTE began around 2010 and increased data speeds; included new 700 and 2100 MHz frequencies.
 - Even smaller handsets, increased battery power, offering more features including Internet access

Site Location Considerations

Spectrum, Coverage, Capacity

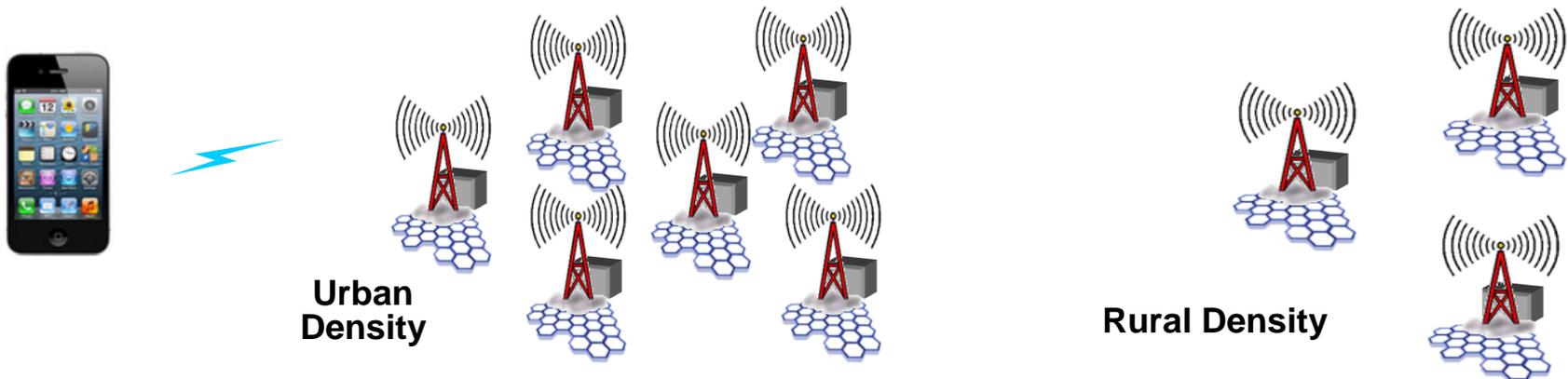


- Wireless service providers do not all use the same frequencies
- Lower frequencies (700-850 MHz) propagate farther than higher frequencies (1900-2400 MHz)
- Spacing of cell sites is influenced greatly by the frequencies that a service provider can use in an area

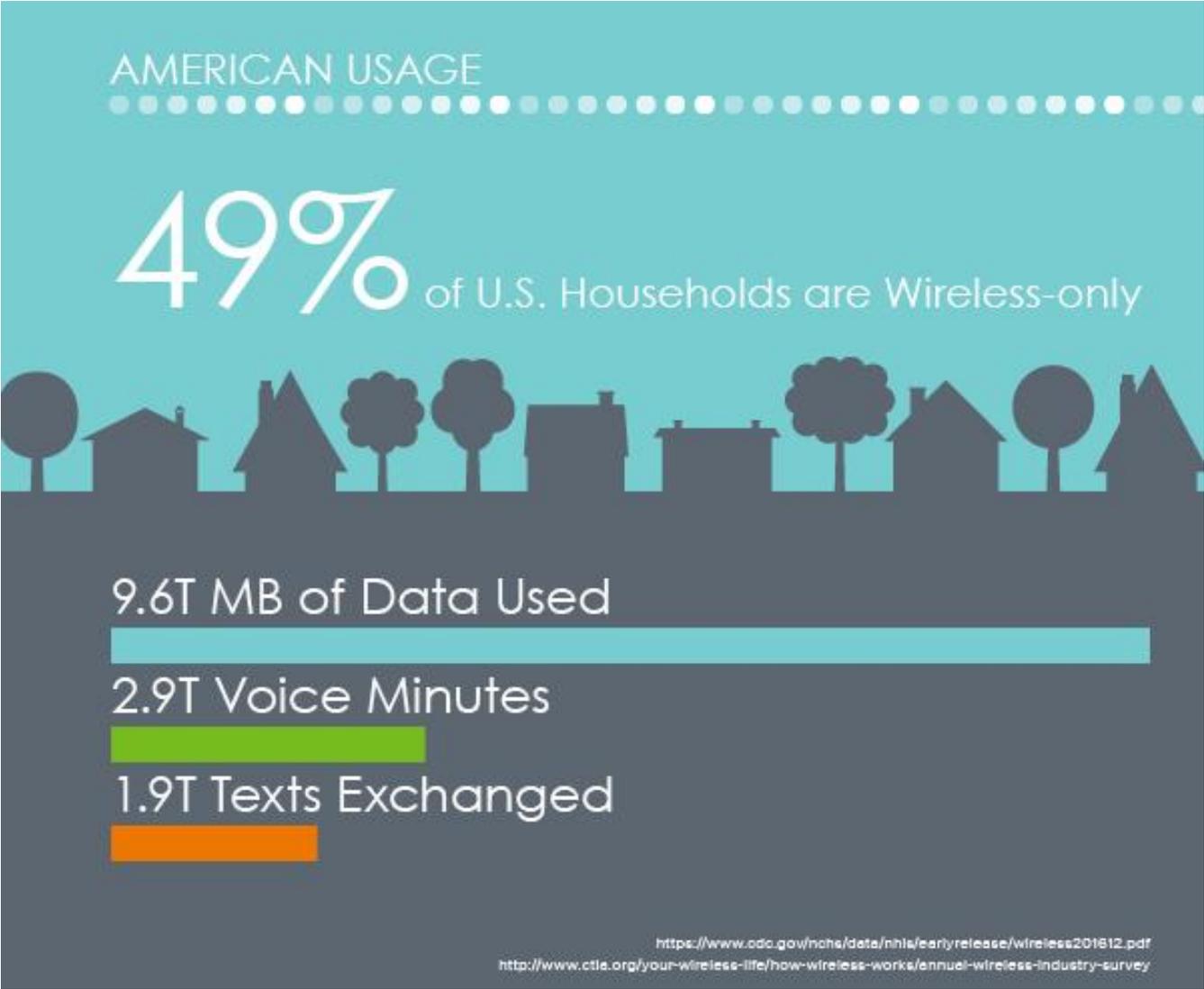
Site Location Considerations

Spectrum, Coverage, Capacity

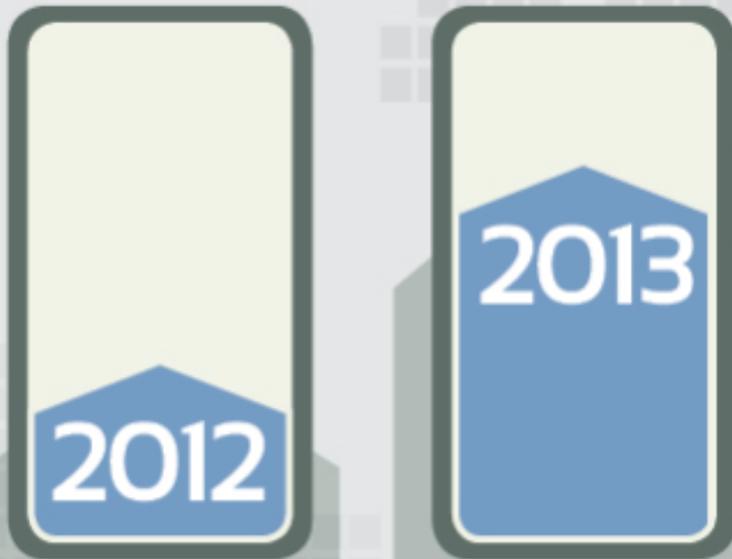
- More use of data intensive applications such as Facetime, Internet, Streaming Music and HD Movies, Social Media, etc.
 - Over 49% of U.S. households have “cut the cord” and are wireless only
 - 45 million Americans use mobile phones as their primary Internet access device
- LTE has stricter alignment tolerances and is more sensitive to interference than older technologies



Quick Facts:



Site Location Considerations Spectrum, Coverage, Capacity



Mobile Data Doubles

U.S. mobile data use doubled from 2012 to 2013, and will increase about 650% by 2018.

Source: Cisco, VNI Mobile Forecast Highlights, 2013-2018, at "United States - 2018 Forecast Highlights and 2013 Year in Review."

Site Location Considerations Spectrum, Coverage, Capacity

A graphic of a tablet with a white screen and orange and grey borders. The screen displays the text '600%' in large blue font, with 'INCREASE IN VIDEO TRAFFIC BY 2018' in smaller blue font below it. There are small grey circles with arrows on the left and right sides of the tablet.

600%

INCREASE IN VIDEO
TRAFFIC BY 2018

Mobile Video Huge Winner

About 56% of all mobile data is now data-intensive video, and that traffic will increase by 600% by 2018.

Source: Cisco, *VNI Mobile Forecast Highlights, 2013-2018*, at "United States - Mobile Applications."

Site Location Considerations Spectrum, Coverage, Capacity



Smartphones Driving Traffic Increase

The network traffic generated by a smartphone is 49 times more than a basic handset, and smartphone traffic is predicted to increase 325% by 2018.

Source: Cisco, VNI Mobile Forecast Highlights, 2013-2018, at "United States - Year in Review and Device Growth Profiles - Smartphones."

Site Location Considerations

Spectrum, Coverage, Capacity



Tablet Use and Bandwidth

The network traffic generated by a tablet is 127 times more than a basic handset, and tablet traffic is predicted to increase by nearly 370% by 2018.

Source: Cisco, VNI Mobile Forecast Highlights, 2013-2018, at "United States - Device Growth Traffic Profiles - Tablets."

Site Location Considerations

Spectrum, Coverage, Capacity

U.S. GLOBAL LEADERSHIP



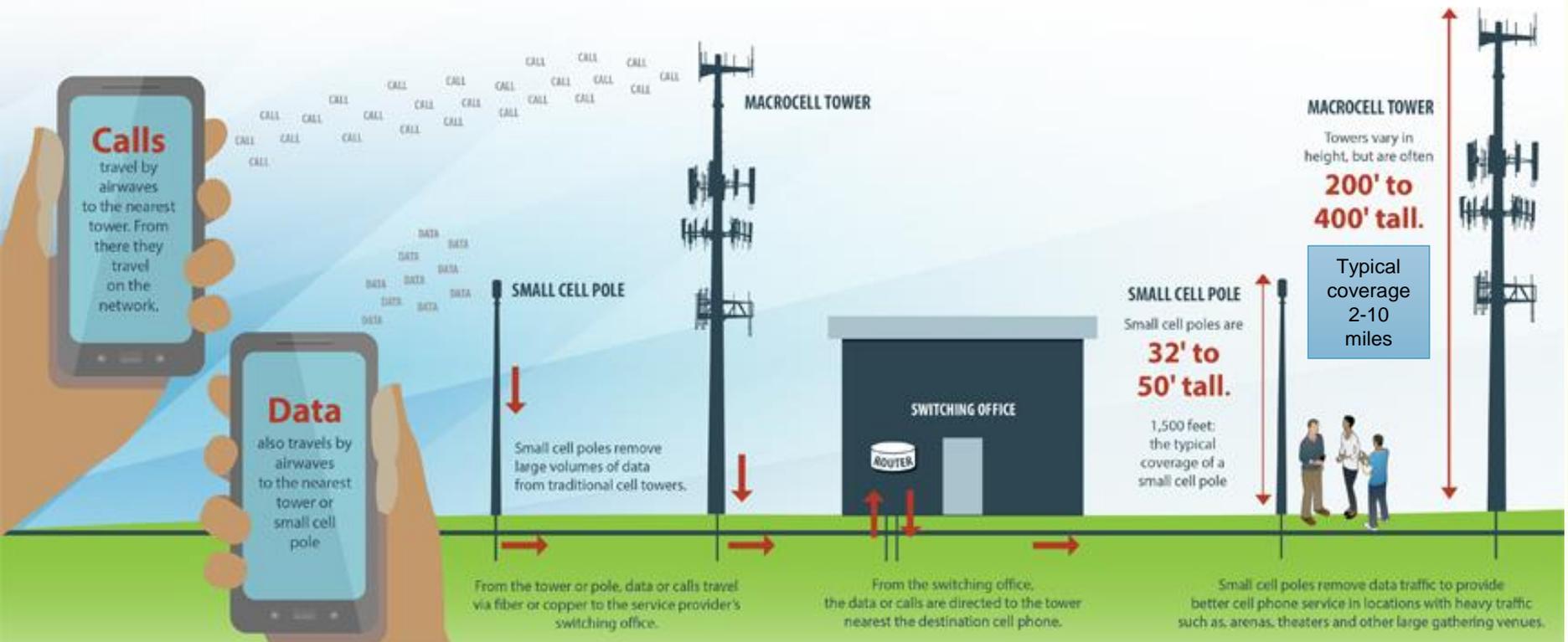
Smartphone
Data Usage



<https://www.ericsson.com/res/docs/2016/ericsson-mobility-report-2016.pdf>

Facility Types

Macro Cell and Small Cell



Macro Cell Infrastructure



Microwave
commonly used
for backhaul



Panel Antennas
with RRU's



Omni-directional
whip type
antenna

Macro Cell Ground Equipment



Typical Low Frequency
(700-850 MHz) Ground
Equipment



Typical High Frequency
(1900-2400 MHz) Ground
Equipment

Non-Concealed Macro Cell Towers



Monopole
Self Support



Lattice
Self Support



Guy
With Support

Collocation on Macro Cell Towers



Monopole Towers
Limited to predesigned ports



Lattice and Guy Towers
Flexible mounting options

Concealed Macro Cell Towers



Flag Pole



Slick Stick

Limited to predesigned ports; one service provider may need multiple ports

Concealed Macro Cell Towers



Faux Dormer



3-Legged Pole

More flexible mounting options

Outdoor Distributed Antenna System oDAS



Small Cell Towers Concealed



- Antenna no more than six cubic feet
- All other equipment no more than 28 cubic feet in volume

Small Cell Facilities



Ground Equipment

Base Station Facilities

Base Station: any structure NOT built for the sole purpose of supporting wireless antenna. Any structure other than a monopole, lattice, guy tower or concealed tower.



Macro Cell Facility



oDAS

Base Station Facilities

Can be concealed



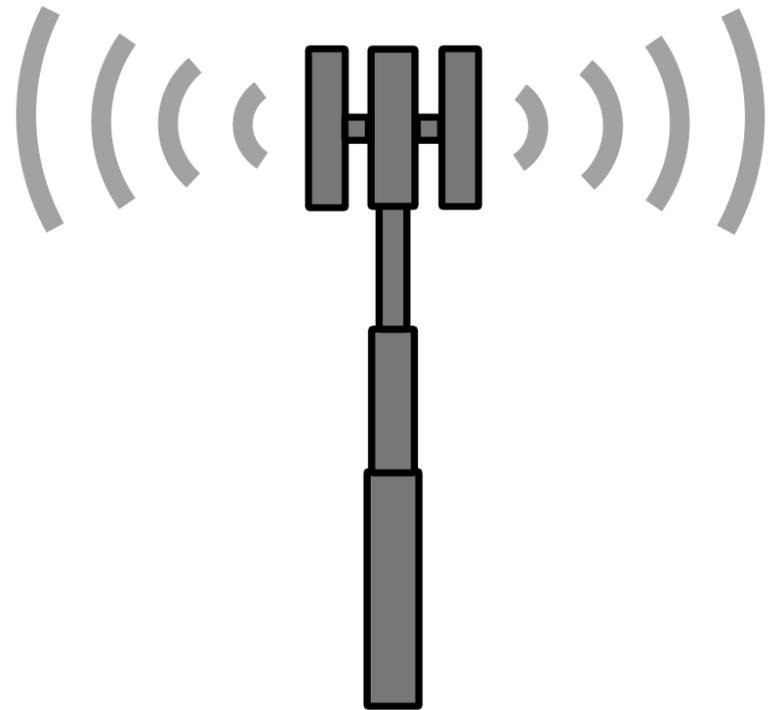
Macro Cell Facility



Small Cell
Make Ready

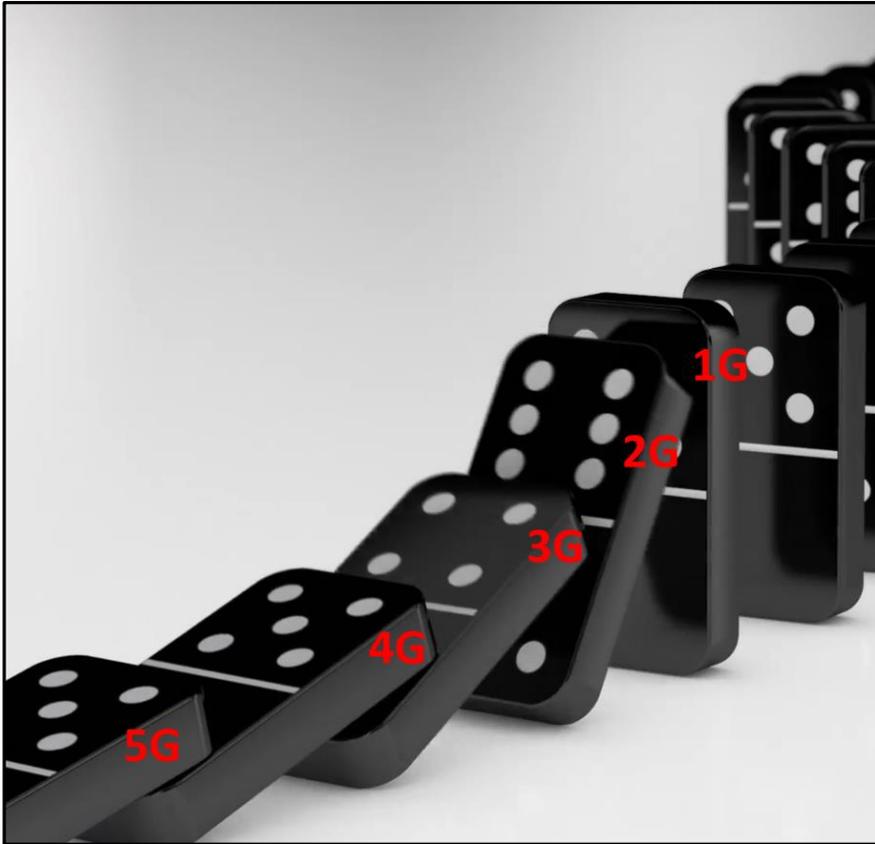
Challenges of Cell Siting From The Industry Perspective

- Availability of potential tower sites in geographic areas to provide coverage and capacity where people live, work, play, and travel
- Speed to market
- Structural analysis on existing towers and base stations
- Local codes for site review process and visual design standards



Projected Network Demand

(by the year 2020 wired services may be virtually non-existent)



- Airtime minutes will continue to increase
- Airtime bandwidth will continue to increase
- More wireless infrastructure necessary to meet demands placed on existing networks
- Wireless networks build on existing network foundation
- Macro cells, small cell, and microcells work together to form complete networks

Wireless Telecommunications Regulatory Parameters

Federal Statutory, Decisional and
Regulatory Law

Federal Legislation Section 704

47 USC §332(c)(7)

(a/k/a Section 704 of the Telecommunications Act of 1996)

Preserves local zoning authority but requires local government to regulate in a manner that:

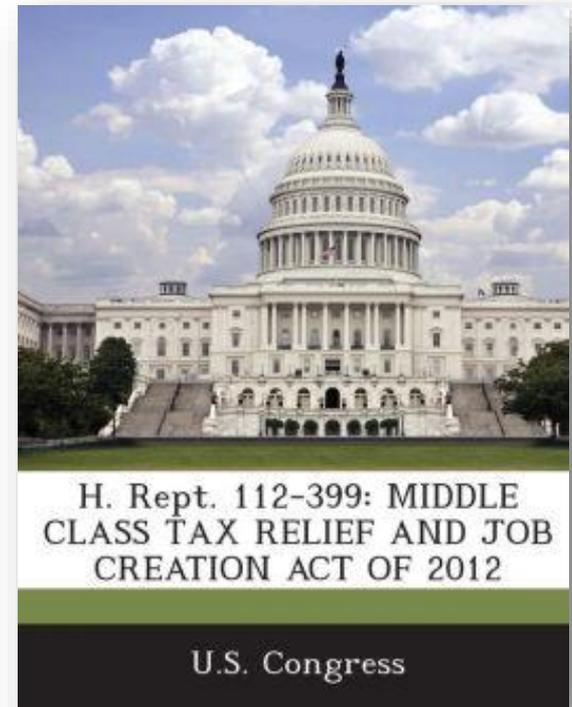
- Does not prohibit or have the effect of prohibiting the provision of personal wireless services
- Will not discriminate among providers of functionally equivalent services
- Does not supersede or undermine federal jurisdiction
- Acts expeditiously on requests
- Provides denials in writing which are not arbitrary

Lighting and Radio Frequency emission are exclusively regulated by federal standards

The Spectrum Act

(Released October 21, 2014 in W.T. Docket 13-238
“Report and Order”)

- Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, referenced as the “Spectrum Act” was enacted by Congress to promote wireless deployments of broadband for public safety and commercial purposes
- Intended to promote and expedite collocations on existing towers, rooftops and any other structure supporting personal wireless communications equipment
- Open access to street right-of-ways to install quickly, with minimal cost, especially in geographic areas currently underserved because of network capacity issues or restrictive zoning standards



The Spectrum Act

As stated in the Spectrum Act,

*“a state or local government may not deny, and shall approve, any **eligible facilities** request for a modification of an existing **wireless tower** or **base station** that does not substantially change the physical dimensions of such tower or base station”*

Eligible Facilities Request – means any request for modification of an existing tower or base station that does not **substantially change** the physical dimensions of such tower or base station involving: collocation; removal of transmission equipment; or replacement of transmission equipment

FCC's Report and Order Clarification and Implementation of Section 6409(a) of the Spectrum Act

A modification that substantially changes the physical dimensions of a tower or base station would fall outside Section 6409(a) if it meets any one of the following items:

- For towers outside the public rights-of-way (ROW), the height of the tower increases by more than 20' or 10%, whichever is greater
- For those towers in the ROW and for all base stations, it increases the height of the tower or base station by more than 10' or 10%, whichever is greater

Vertical Height Increase Example Outside the Right-Of-Way



96" to 105"
antenna heights
(average 8'3")



Section 6409(a)

10% of 80' is 8'

$80' + 8' = 88'$

$80' + 20' = 100'$

Tower could increase to maximum of 100'

**For towers in the rights-of-way height increase allowed
is 10' or 10% whichever is greater**

Base Station Height Modification Example



- 10' increase to 40' new height

- 30' original base station height

Section 6409(a)

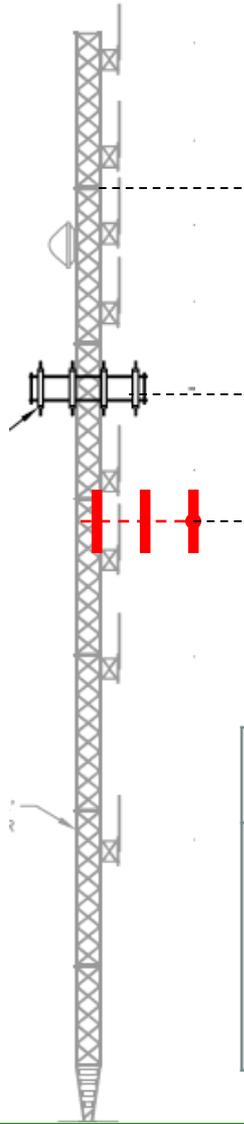
10% of 30' is 3' = 33'

30' + 10' = 40' (this is the greater)

Base Station could increase to maximum of 40' and meet definition of substantial

- Area of Base Station is entire rooftop once approved.
- Cannot require additional concealment if original “eligible facility” is not concealed.

Tower Width Increase Outside ROW Example



Width of tower is 3'

Appurtenance is 10' from edge of tower

Appurtenance could extend up to 20'
from edge of tower

Section 6409(a)

- 20' from edge of tower or
- Width of tower at level of appurtenance
- Whichever is greater

FCC's Report and Order Clarification and Implementation of Section 6409(a) of the Spectrum Act

- It involves installation of more than the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets
- It entails any excavation or deployment outside the current site of the tower or base station
- It would defeat the existing concealment elements of the tower or base station
- It does not comply with conditions associated with the prior approval of the tower or base station unless, the non-compliance is due to an increase in height, increase in width, addition of cabinets or new excavation that does not exceed the corresponding “substantial change” thresholds

FCC's Report and Order Clarification and Implementation of Section 6409(a) of the Spectrum Act

- Local government can require compliance with generally applicable building, structural, electrical and safety codes or with other laws codifying objective standards reasonably related to health and safety.
- Collocations meeting the standards as defined in the Order and/or Section 6409 are to be approved within a 60 day time frame, excluding any tolling periods for incomplete applications

North Carolina HB 310

An Act to Reform Collocation of Small Wireless Communications Infrastructure and Aid in Deployment of New Technologies

- Approved and effective July 21, 2017
- Specific to small cell deployment only
- Provides for collocation of small cells on existing infrastructure in the Right-Of-Way to be approved administratively
- Allows minimal development standards by the local government
- Prescribes a review process
- Sets fees local governments can charge for small cell collocations in the Right-of-Way

Introduction to Wireless Telecommunications Master Planning

**For Personal Wireless Service
Facilities (PWSF)**

What is a Wireless Communication Master Plan?

- A proactive approach specifically for the development of communities long range goals and objectives for wireless telecommunications
- CityScape develops Master Plans detailing all current PWSF infrastructure while developing a realistic future evolution blueprint that will allow communities to direct the growth while maintaining the aesthetics of the community

Wireless Master Plan and Ordinance Revisions

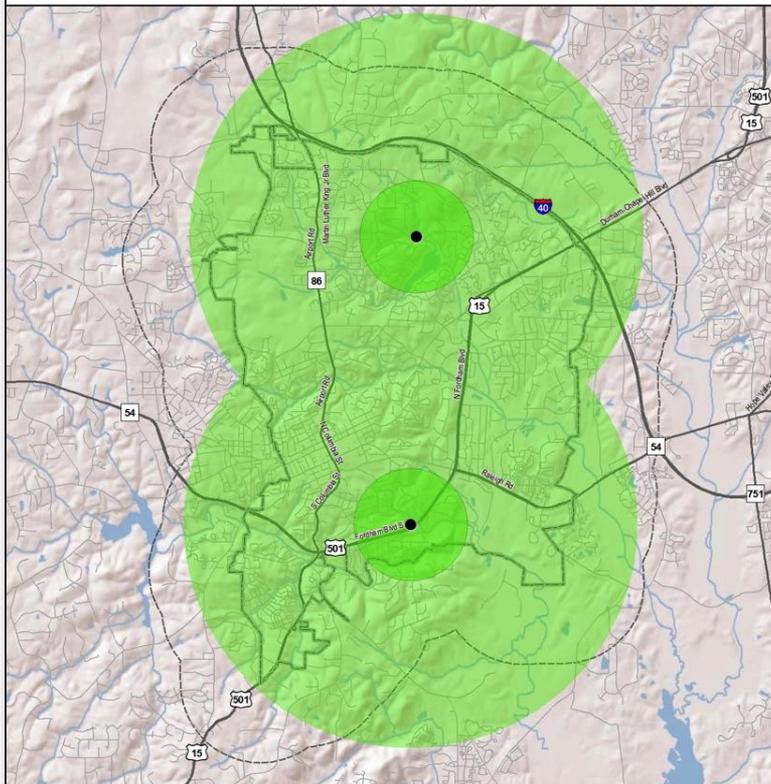
Wireless master plans are unique to each community because it builds on existing tower and base station infrastructure and geographic particulars

Updating existing regulations in conjunction with the wireless master plan ensures:

- Community is compliant with the complexity and fluidity of federal regulations
- Community is best prepared for wireless siting applications going forward
- Community has defensible positions if challenged by an applicant over a siting decision

Low and High Frequency Root Mean Square RMS Maps

Theoretical Low Frequency Coverage From a Single Provider

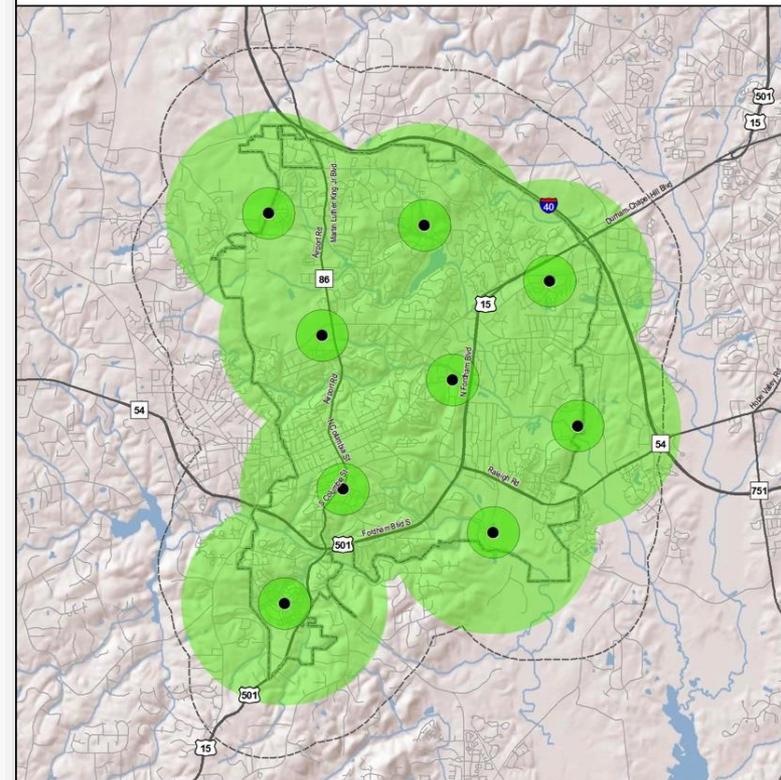


- Theoretical Site
80' Elevation
- Approximate Coverage
- Search Area
- Handoff Area
- Corporate Limits
- One Mile Buffer
- Major Roads
- Minor Roads

Sources: US Census Bureau,
CityScape Consultants, Inc, USGS
Map Created by CityScape
Consultants, Inc. on
August 24, 2017
0 0.25 0.5 1 Miles



Theoretical High Frequency Coverage From a Single Provider



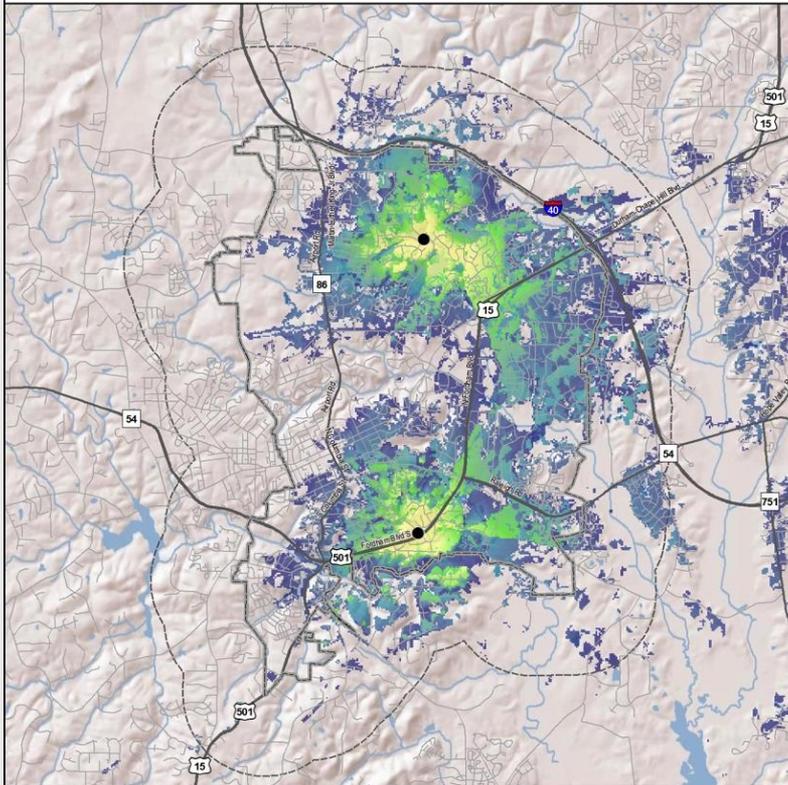
- Theoretical Site
80' Elevation
- Approximate Coverage
- Search Area
- Handoff Area
- Corporate Limits
- One Mile Buffer
- Major Roads
- Minor Roads

Sources: US Census Bureau,
CityScape Consultants, Inc, USGS
Map Created by CityScape
Consultants, Inc. on
August 24, 2017
0 0.25 0.5 1 Miles



Low and High Frequency Theoretical Propagation Coverage

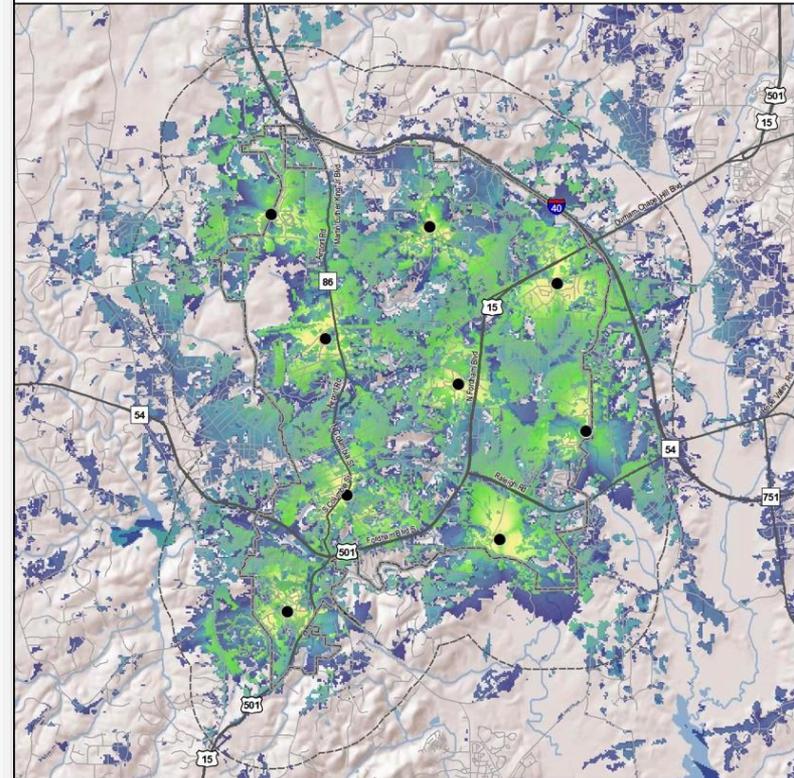
Theoretical Coverage From a Single Provider
With Terrain and Signal Strength at Low Frequency



- Theoretical Site
80' Elevation
 - Approx Signal Strength
 - Superior
 - Average
 - Acceptable
- ⊕ Corporate Limits
 - ⊖ One Mile Buffer
 - Major Roads
 - Minor Roads

Sources: US Census Bureau,
CityScape Consultants, Inc, USGS
Map Created by Cityscape
Consultants, Inc. on
August 25, 2017
0 0.25 0.5 1 Miles
N

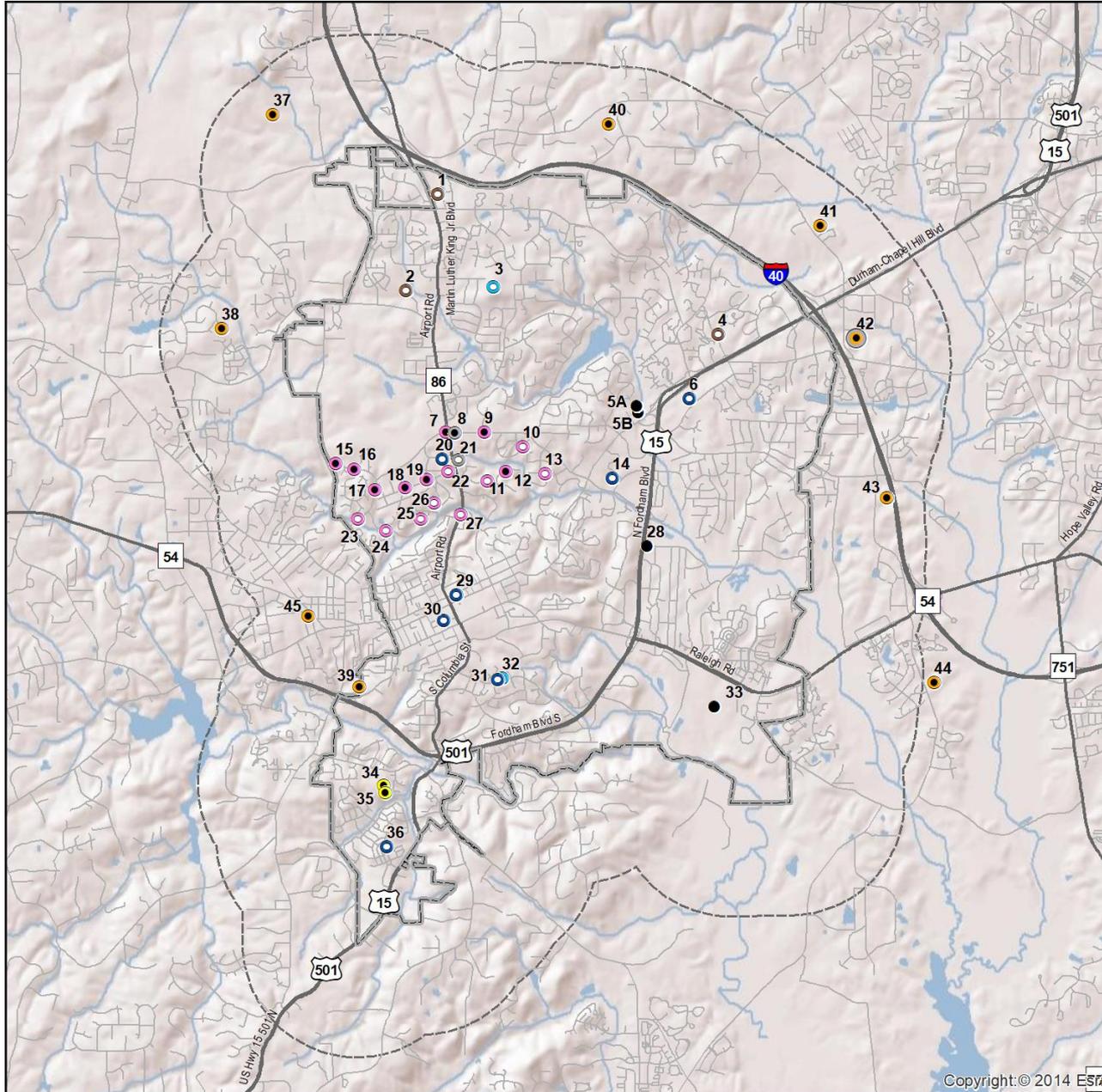
Theoretical Coverage From a Single Provider
With Terrain and Signal Strength at High Frequency



- Theoretical Site
80' Elevation
 - Approx Signal Strength
 - Superior
 - Average
 - Acceptable
- ⊕ Corporate Limits
 - ⊖ One Mile Buffer
 - Major Roads
 - Minor Roads

Sources: US Census Bureau,
CityScape Consultants, Inc, USGS
Map Created by Cityscape
Consultants, Inc. on
August 25, 2017
0 0.25 0.5 1 Miles
N

Draft Inventory Map



Chapel Hill Tower Inventory

Towers

- Outside Right-Of-Way
- Small Cell Inside Right-Of-Way
- Concealed
- Dual Purpose
- Outside Study Area

Base Stations

- Rooftop
- Water Tower
- Utility Easement
- Small Cell Inside Right-Of-Way
- Concealed

- ⊕ Study Area
- ⊕ Corporate Limits
- ⊕ One Mile Buffer
- Major Roads
- Minor Roads

Sources: US Census Bureau, CityScope Consultants, Inc, USGS

Map Created by Cityscope Consultants, Inc. on September 6, 2017

0 0.25 0.5 1 Miles



Inventory Facility Example

Preliminary Draft Master Plan Maps - Town of Morrisville, NC - November 16, 2012

Inventory

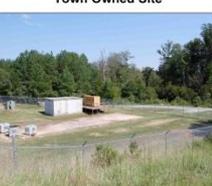
	<p>SITE LOCATION 1 Crown Castle International FCC # 1063926 CCI ID: 881315 7001 Development Drive Latitude: 37-52.1 N Longitude: -78-52-34 W</p> <p>Height: 195' Type: Monopole Future Capacity: 3</p>		<p>SITE LOCATION 2 KGI FCC # 1245668 KGI ID: 21364 3326 NC Highway 55 Latitude: 35-51-21.5 N Longitude: -78-53-39.4 W</p> <p>Height: 184' Type: Monopole Future Capacity: 3</p>
	<p>SITE LOCATION 3 Wake County FCC # 1233784 ID: HP-1322 NC Hwy 55 Latitude: 35-50-56.9 N Longitude: -78-53-32.8 W</p> <p>Height: 262' Type: Lattice Future Capacity: 5</p>		<p>SITE LOCATION 4 Crown Castle International FCC # 1003636 CCI ID: 815527 4600 Emperor Way Latitude: 35-52-24.9 N Longitude: -78-50-18.8 W</p> <p>Height: 150' Type: Monopole Future Capacity: 4</p>
	<p>SITE LOCATION 5 American Tower Corporation FCC # 1063435 ATC ID: 306362 1250 Innovation Avenue Latitude: 35-52-3.3 N Longitude: -78-49-19.9 W</p> <p>Height: 161' Type: Monopole Future Capacity: 3</p>		<p>SITE LOCATION 6 Tower Assets Newco IX, LLC FCC # 1065734 1250 Innovation Avenue Latitude: 35-52-8.1 N Longitude: -78-49-7 W</p> <p>Height: 155' Type: Monopole Future Capacity: 3</p>
	<p>SITE LOCATION 7 Crown Castle International FCC # 1006912 CCI ID: 814011 960 Airport Boulevard Latitude: 35-51-25.5 N Longitude: -78-49-12 W</p> <p>Height: 177' Type: Monopole Future Capacity: 2</p>		<p>SITE LOCATION 8 SBA FCC # 1239354 SBA ID: NC20297 1500 RDU Center Drive Latitude: 35-51-1.16 N Longitude: -78-47-46.03 W</p> <p>Height: 154' Type: Monopole Future Capacity: 3</p>

■ EXISTING ■ PROPOSED ■ PUBLIC SAFETY

Preliminary Draft Master Plan Maps - Town of Morrisville, NC - November 16, 2012

Site A	Site Location	Town Owned Site	Preferable Option
Town of Morrisville			
Luther Green Center			
920 Church Street			
Public Park			
Agricultural District			
6.072 Acres			
Preferable Second Option: Flag Pole			

Site B	Site Location	Town Owned Site	Preferable Option
Town of Morrisville			
Perimeter Park			
0 Walkins Road			
Vacant			
Office & Institutional			
0.457 Acres			
Preferable Second Option: Painted Pole or Slick Stick			

Site C	Site Location	Town Owned Site	Preferable Option
Town of Morrisville			
Eastridge			
0 Perimeter Park Drive			
Pump Station			
Office & Institutional			
2.383 Acres			
Preferable Second Option: Monopole or Painted Pole			

Initial Wireless Stakeholder Information For Town of Chapel Hill

45 Towers and Base Stations throughout the study area

Wireless service providers for mobile radio, phone, and broadband include:

- Metro PCS
- Altell
- AT&T
- Clearwire
- Cricket
- Light Squared
- Sprint
- T-Mobile
- Verizon
- A variety of broadcast stations

Tower owners include but are not limited to:

- American Tower Corporation
- Crown Castle International
- Skyway Tower
- A variety of public agencies and broadcast companies



Introduction to Wireless Telecommunications Land Use Regulations

Master Planning and Zoning

Possible Zoning Solutions

Wireless Telecommunication Regulations should include the following:

- Statement of Intent or Purpose of Regulations
- Definition and standards compliant with FCC and State Statutes
- Hierarchy of Preferred Types and Location of Facilities depending on community likes and dislikes, including use of public facilities
- Zoning Chart encouraging preferred types and locations and discouraging non-preferred types of facilities
- Uniform process that does not discriminate unduly among any providers of wireless services
- Hierarchy of submittal requirements, less extensive for preferred facilities and more extensive for non-preferred facilities
- Development standards

Possible Locations and Possible Types of Future Sites

Locations:

- Existing Towers
- Rooftops
- Steeples
- Water Tanks
- Zoning Districts
- Publicly-owned Land
- Light Stanchions

Types:

- Concealed Base Station
- Non-Concealed Base Station
- Collocation
- Mitigation/replacement
- Concealed Freestanding Tower
- Non-Concealed Freestanding Tower

Wireless Communication Survey

pollev.com/toch

Using your mobile device, please click on the pictures or statements in the following slides that best answer the questions posed

Next Steps

- In-Meeting Poll Will Continue Online
 - pollev.com/toch
- Contact - Phil Mason, WTI Project Manager
 - telecomm@townofchapelhill.org
 - chplan.us/wireless-initiative
- Optional Second Public Information Meeting
- Begin Drafting the Master Plan and Ordinance



Wireless Telecomm Initiative



TOWN OF CHAPEL HILL