

5G/SMALL CELL WIRELESS OVERVIEW

Environmental Quality & Public Works Committee



LEXINGTON

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Agenda

- Wireless technology history
- 5G Evolution/Revolution
- What are Small Cells?
- Why are Small Cells required
- 5G/Small Cell deployment – Lexington's role
- FCC 5G Regulation
- Summary



Short History of Wireless

- 1G* (1979) – introduced analog voice
- 2G* (1991) – introduced digital voice
- 3G* (2001) – introduced mobile data
- 4G*/4G LTE** (2009) – paved the way for widespread internet usage
- 5G* (2020) – standards under development – speeds up to 10 gbps, more than 600 times faster than typical 4G speeds today¹

*G – generation

**LTE – Long Term Evolution



5G Evolution/Revolution*

Evolution

- Minimal lag streaming videos/playing games/video calls
- Instant access to files online

Revolution

- Reliable internet in remote areas
- Enable autonomous vehicles
- Enable Internet of Things (IoT)

***As with past generations of wireless service, but even more so, wireline providers will be essential to the successful deployment of 5G networks. In particular, 5G will require increasingly dense fiber deployed closer and closer to end user locations in order to offload the extremely high volume of anticipated data demand from wireless cell sites.¹**

- ❑ AT&T Doug Mendel, Senior Research and Analysis Manager: 5G “as vast a change in our market as the internet...”
- ❑ Hans Vestberg, Verizon CEO: 5G “quantum leap as compared to 4G...”

¹Achieving the Promise of Fiber-Enabled 5G Networks, USTELCOM, Patrick Brogan, October 27, 2017

Small Cells v.s. Macro Cells

Small Cell (added to streetlight pole)

Macro Cell Tower (typical)



Small cells are portable miniature base stations that require minimal power to operate and can be placed every 250 meters or so throughout cities. To prevent signals from being dropped, carriers could blanket a city with thousands of these stations. Together, they would form a dense network that acts like a relay team, handing off signals like a baton and routing data to users at any location.

Existing Small Cell Installations in Lexington





Why are Small Cells Required?

- 5G Standards will not be fully defined until the 2019 World Radiocommunications Conference (October 28, 2019) but two “distinct flavors” will emerge:
 1. Low – and mid – band frequency 5G (below 6 gigahertz)
 2. High – band frequency 5G (above 6 gigahertz).
- Both these flavors will be used to augment and enhance existing 4G LTE networks rather than replace them.
- **5G High band frequencies will require a fundamentally different architecture with much denser networks – 15 to 20 sites per square kilometer (.4 square miles) in highly populated urban environments, as opposed to two to five sites today.¹**
- Note: Jessica Rosenworcel, FCC Commissioner, estimates that **800,000 Small Cells** will be required in the next 8 years to support 5G. **Each Small Cell requires power, fiber connectivity, and site access.**

¹McKinsey&Company, Are you ready for 5G, February 2018 by Mark Collins, Arnab Das, Alexandre Menard, and Dev Patel

5G/Small Cell Deployment

What is the city's role?

- Award Telecom Franchise agreements to qualified applicants
- Manage Public Rights-of-Way
 - Balance between wireless service requirements and aesthetics
 - Revise/update Chapter 17C to keep pace with the changing telecom environment
- Develop a strategic plan to effectively utilize fiber assets and the 5G infrastructure to enhance city services and deploy smart city applications



5G FCC Regulation

FCC Order – Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Deployment – September 2018

“FCC votes to override local rules to speed 5G deployment”

1. Speed of deployment – “shot clock” for local governments to respond to applications
 - ☐ 90 days new locations
 - ☐ 60 days existing locations
2. Fees – reasonable approximation of their cost for processing¹

¹FCC cracks the whip on 5G deployment against protest of local government, Techcrunch, Devin Coldewey, 5 months ago

Summary

- 5G wireless/Small Cell deployment will provide communities with opportunities to implement new mobile services for citizens.
- 5G wireless/Small Cell deployment will enable the growth of IoT applications.
- 5G wireless/Small Cell deployment will enable communities to implement smart city applications.
- 5G wireless/Small Cell deployment will provide citizens with enhanced mobile internet access.

Summary

- 5G will not replace existing 4G wireless networks but will be an evolution of those networks over time (backward compatible).
- 5G wireless standards will be finalized in 2020.
- 5G will dramatically change the capability of wireless services because of its increased speed and bandwidth.
- Small Cells will be located closer together to support 5G high band frequencies because the signal will not travel as far.
- Wireless companies are looking to install Small Cell technology in dense urban areas to prepare for 5G implementation.¹
- FCC 5G order overrides local rules.

¹Note: Wireless companies are installing Small Cells in some areas to "densify" existing 4G service

Questions?



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