

TILSON

5G DISCUSSION

November 13, 2019



ABOUT ME AND TILSON

- Recovering network engineer, started deploying networks in the Army
- Today I run Tilson, on a mission to build America's information infrastructure
- 600 employees, 23 locations, Portland, Maine HQ
- For industry and government:
 - IT and telecom consulting
 - Engineering (professional/network)
 - Network Construction
 - Network Maintenance
 - Utility pole development and lease back
- Intelligent transportation, smart city, broadband, public safety

5G

4G AND 5G TERMS

4G and high power LTE

- Small cells

Deeper spectrum and better software with LTE (4.5G or 5GE)

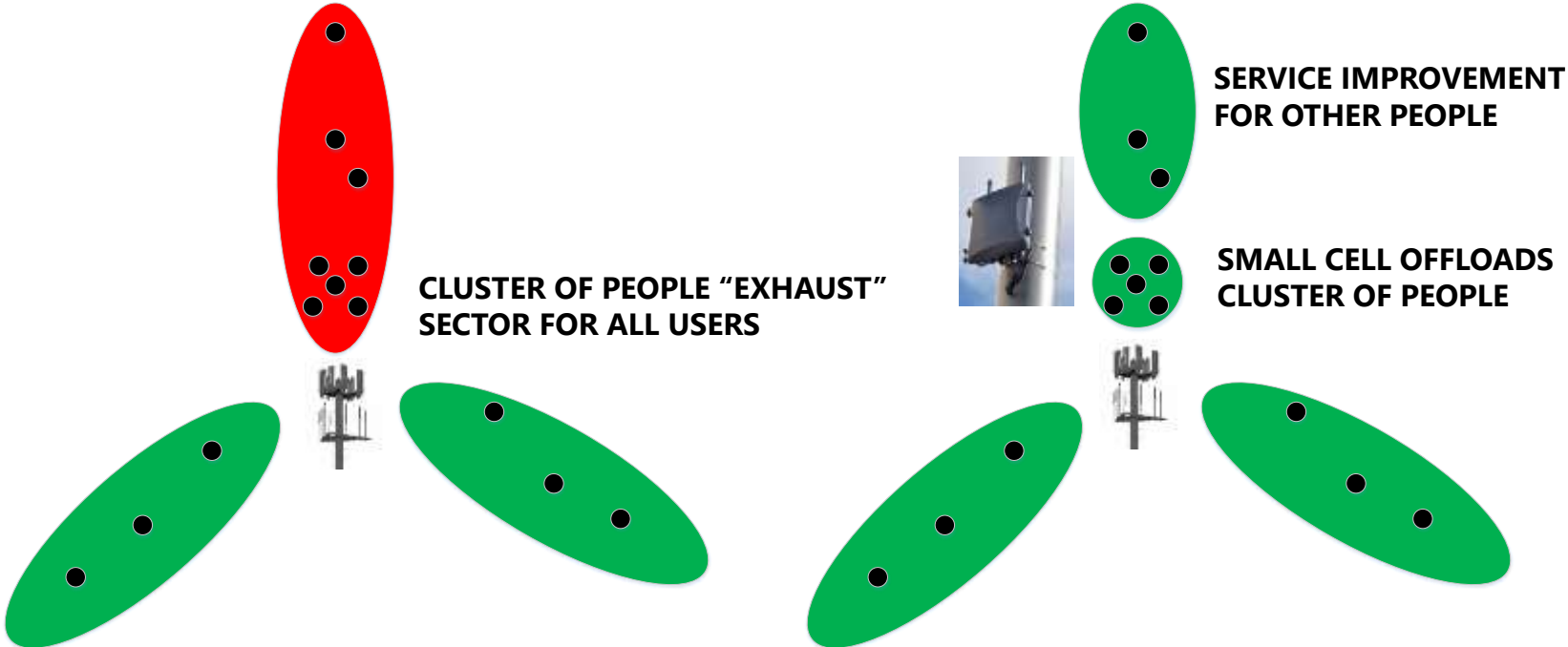
- CBRS and LAA

What does 5G promise?

- Very low latency
- Very fast speeds
- Examples of use cases



WHAT'S DRIVING SMALL CELLS IN 4G?





WE FIGURED THIS OUT WITH 4G RIGHT?

- LTE small cells generally are about capacity rather than coverage
- LTE has largely been collocated, some new poles
- LTE has seen modest node counts
- LTE front haul has been medium density
- Not deployed in some places because of local conditions

WHAT'S DRIVING DEPLOYMENT IN 5G?

Mobility coverage for the big guys – cellular carriers

- Verizon
- AT&T
- T-Mobile/Sprint
- USCC
- Dish
- Regional carriers

Fixed wireless for broadband – competitive with fiber/cable, cellular operators, and others coming – cable, telcos, WISPS



5G TECH

5G NR standard – 3GPP

- Non-standalone (works with LTE)
- Standalone
- First commercial deployments in the USA in 2019

Technologies broadly associated with 5G

- Beam forming antennas – in Maine!
- Massive MIMO - in Maine!
- mm band small cells – coming soon in Maine, big cities first
- Low band LTE, plus MIMO and beam forming – in Maine!
- Low band 5G NR – coming soon in Maine, big cities first



5G TECH

Devices

- Handsets
 - Samsung - now
 - Motorola – now
 - iPhone – 2020
- Hot spots - now but only where 5G networks are on, most major cities in 2020
- Home devices - now, but only where 5G networks are on, most major cities in 2020

Safety?



5G TERMS, INFRASTRUCTURE

Other terms

- 5 GHz, highish band spectrum used for unlicensed or licensed Wi-Fi networks, could be any speed, not generally used in cellular
- 5Gx, WISPs means fast point to point wireless, hundreds of Mbps speeds (or more), sometimes using 30Ghz spectrum or 30Ghz spectrum bonded with a lower band spectrum (2.5Ghz or 5Ghz)

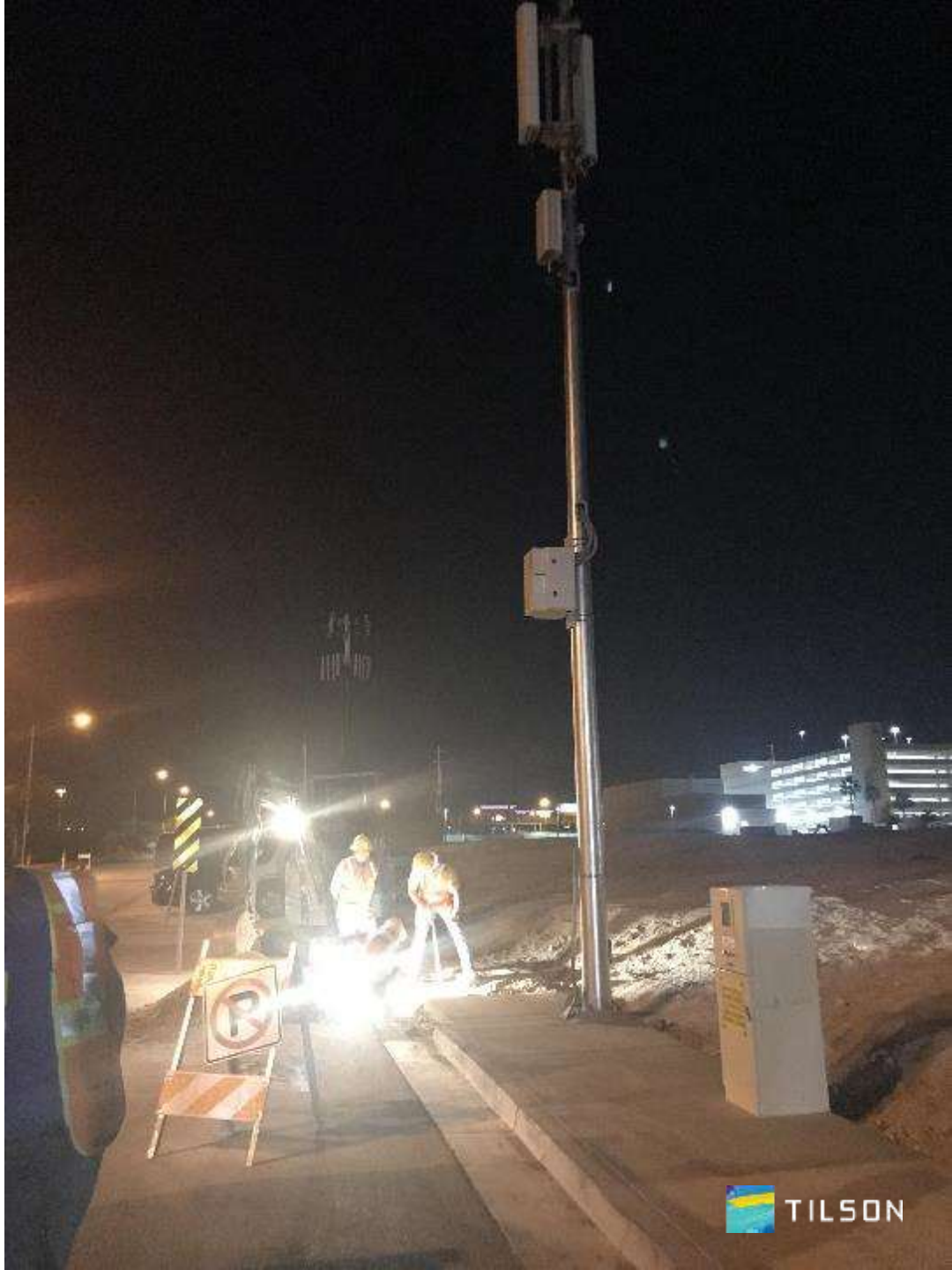
Infrastructure for 5G

- Dense fronthaul fiber
- Clear path for street level colocation
- Power



CHALLENGES TO OVERCOME

- Street level colocation is a knife fight in many communities
- Power distribution architecture at light poles often low capacity, daisy chained 277 volt AC, \$10-30k/site costs are common
- Existing light poles are often structural fails – new structures needed
- OSP environment is crowded – colocation options are limited, and diminishing
- Fiber access, fiber strand consumption



IF 5G ROW WORK WERE A MICHAEL BAY MOVIE...

What carriers want is hard

- Speed
- Scale
- Cost

The conditions are hard

- Community
- Incumbent utilities
- History

Just like the Stan – hostile landlords, difficult power





NEXT GENERATION OF WIRELESS COLOCATION

- Existing utility poles
- Street lights
- New poles

4G, 4.5G, 5G





URBAN 5G POWER AND FIBER

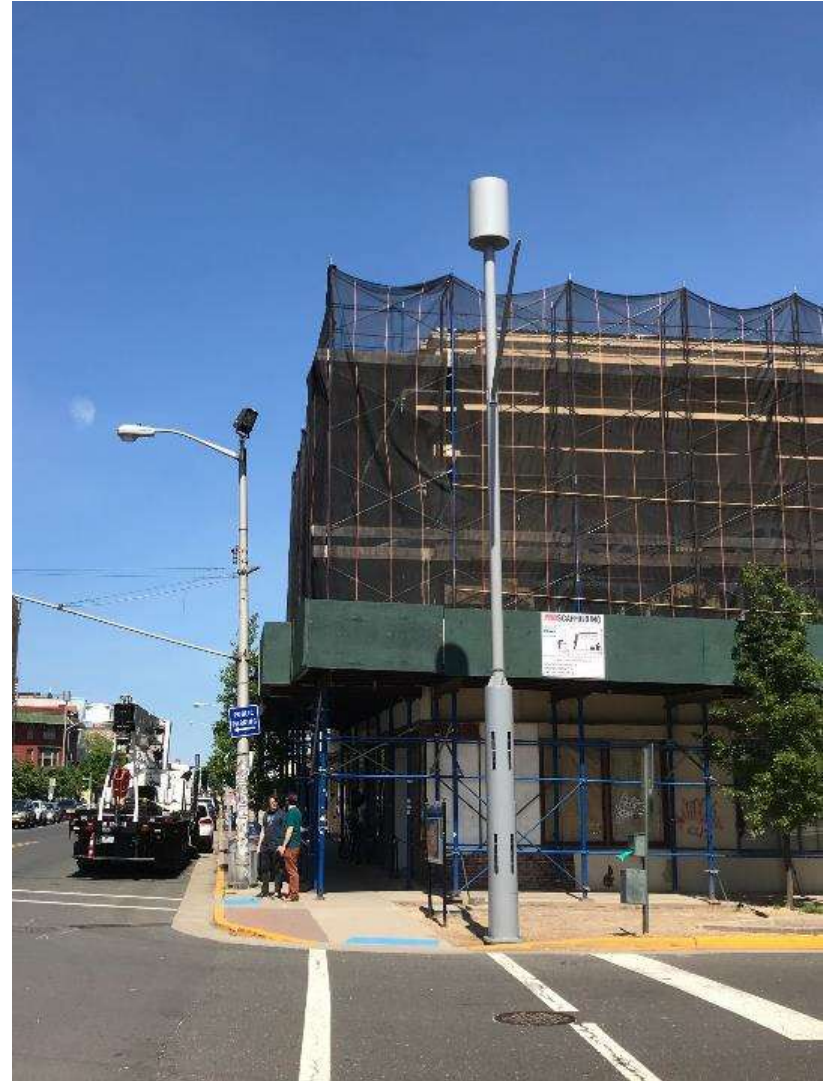


CASE STUDY: JERSEY SHORE

- 22 Sites in one municipality
- 4 are WiFi only for an ISP
- 18 are high power LTE for cellular carrier + WiFi for ISP, getting 5G upgrades now
- Poles owned by Tilson's CLEC
- ILEC owns the fiber that feeds the cellular carrier and ISP
- Smart Cities tech – already purchased by city, potentially to be implemented on same sites
- 5G going onto these sites – providing faster broadband than WiFi, more 5G sites needed than current 4G footprint







ALTERNATIVE FIBER INSTALLATION TECHNIQUES



METAL POLE SOLUTIONS

- **Multi-frequency high power LTE**
- **LAA/CBRS**
- **5G**
- **Smart city**
- **WiFi**



CONCEALMENT AND POLE INTEGRATION



WISP ON POLES, TV WHITE SPACE





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