

# **Delivering the Full 5G Vision**

**CTIA 5G Summit**

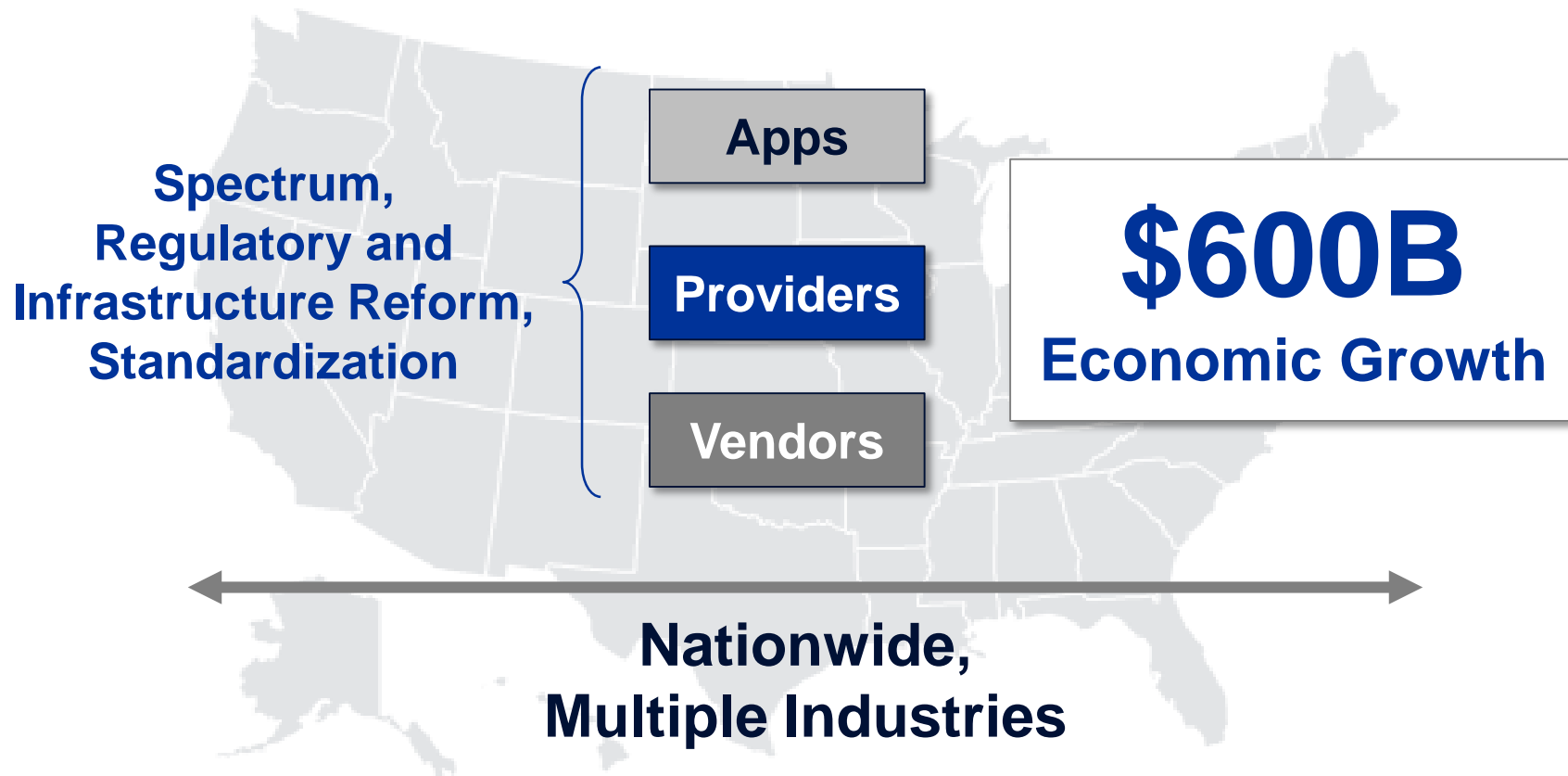
**Washington, D.C.**

**April 4<sup>th</sup>, 2019**

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**CTO, North & South America**

# 5G Vision



# Progress to Date

- ✓ Restoring Internet Freedom
- ✓ Accelerating Wireless Broadband
- ✓ mmWave Auctions
- ✓ Spectrum Strategy Memorandum



**Great progress in regulatory reform & mmWave**

## FCC Auctions

**2019**

28, 24,  
37, 39, 47

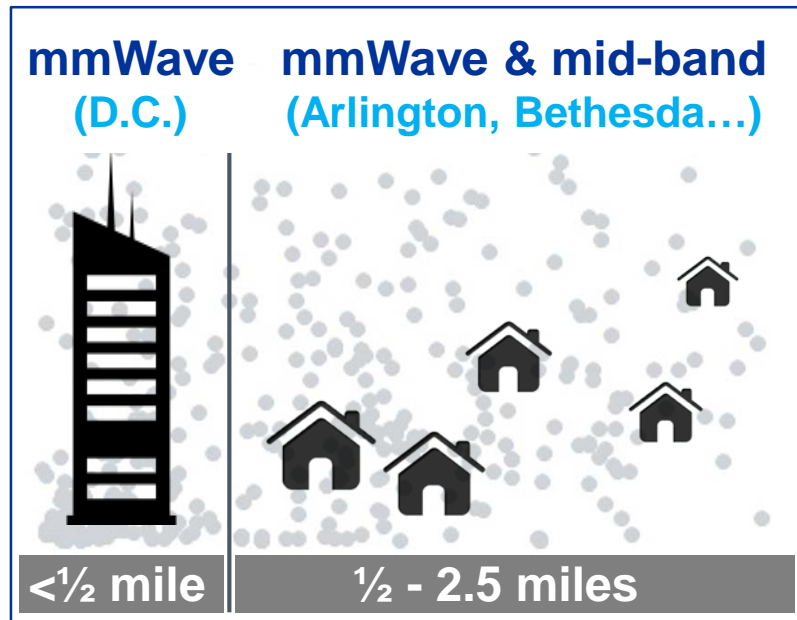
**5.55 GHz**

**2020+**

PAL, 3.1,  
3.7

**370 MHz**

# Use Case : Consumer, High-Speed Mobility



— Distance Between Cell Sites —>

## D.C.

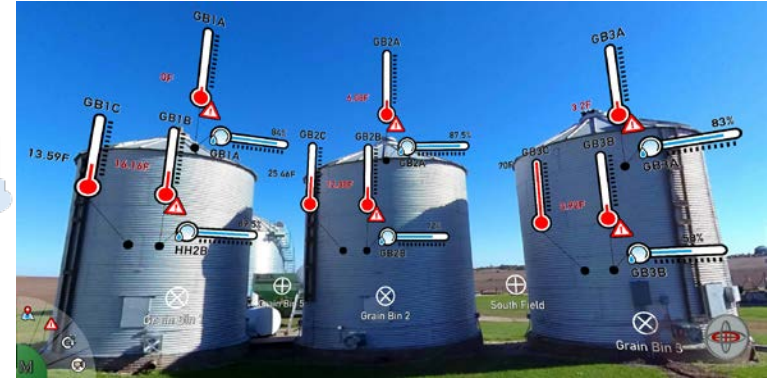
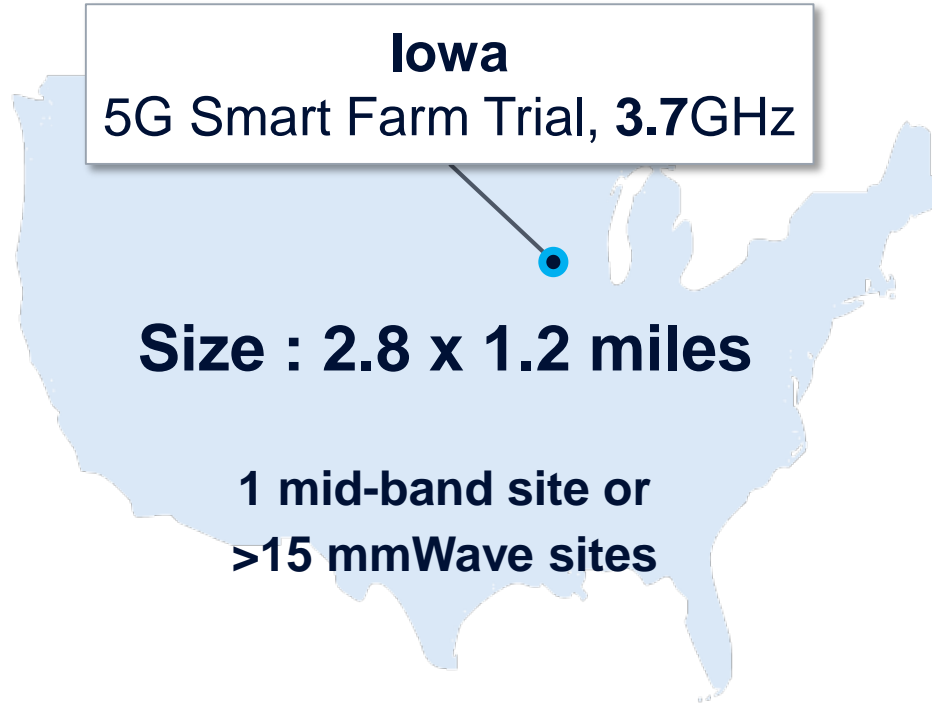
- ✓ 3x mmWave sites to match 4G

## Outside D.C.

- x 4-10x mmWave sites to match 4G (or much more)
- ✓ Mid-band required for full coverage

**5G mmWave across D.C.  
and selected sites elsewhere**

# Use Case : Agriculture, Smart Farm



**Costs would be challenging  
with mmWave only**

# Use Case : Manufacturing, Industry 4.0



**Challenging Environment**  
Due to clutter

**Indoor Coverage Area**  
3.5GHz = 20x more efficient  
vs mmWave (fewer sites)

**mmWave challenging  
in some factories**

# Where Are We?

## Progress To Date

- ✓ mmWave
- ✓ Siting reform
- ✓ Initial use cases

## Gaps to 5G Vision

- Mid-band
- Infrastructure 2.0
- Standardization

## Example Solutions



**Mid-Band Spectrum**  
(Shanghai 5G)



**Infrastructure 2.0**  
(5G-Ready)



**3GPP Standardization**  
(Industry Requirements)

**Good start, more needed to deliver the full 5G vision**

# NOKIA

