

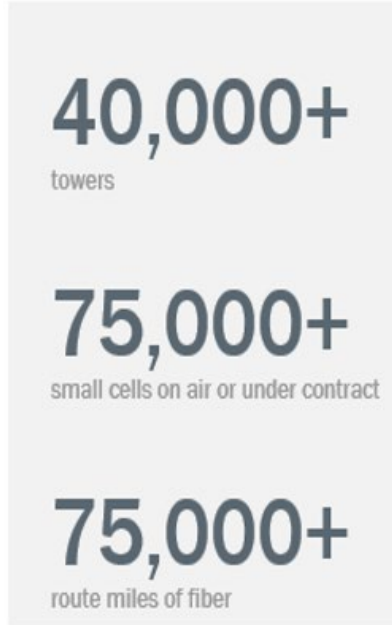


# Wireless Infrastructure & Telecommunications

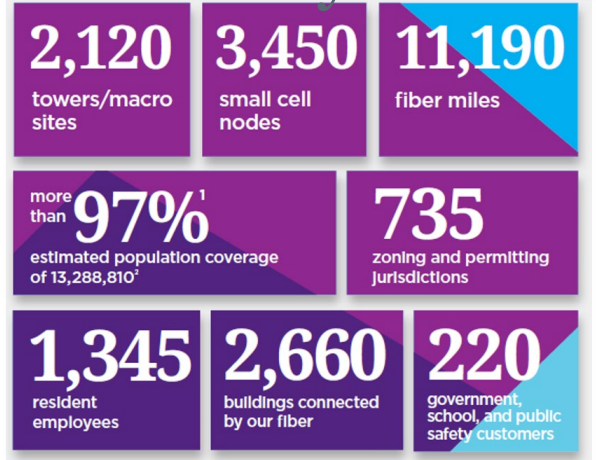
Transportation in the  
Smart City Ecosystem

DECEMBER  
2019

# About Crown Castle



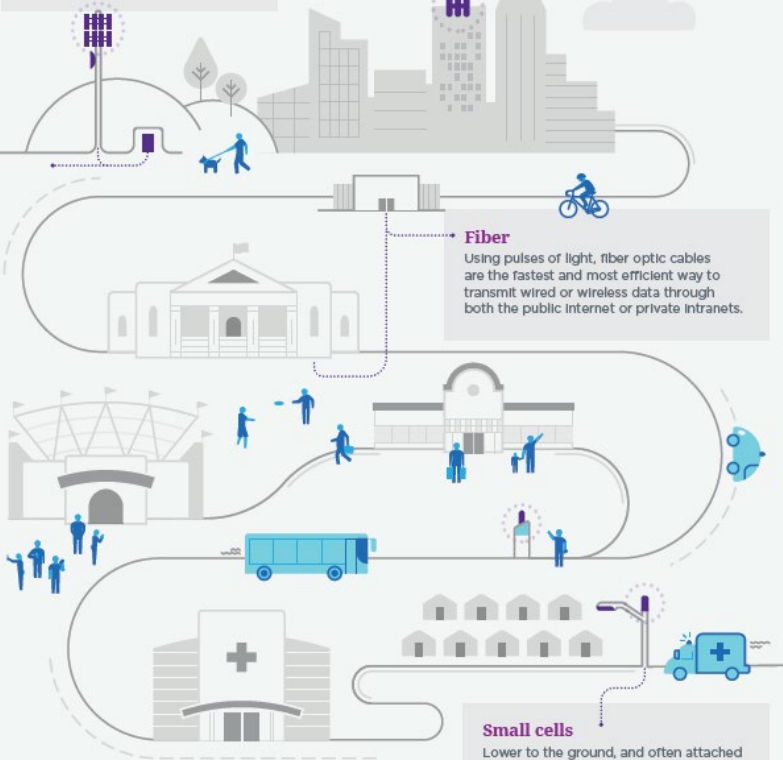
## In Pennsylvania



# How Infrastructure Impacts Wireless Connectivity

## Cell towers

Towers receive and transmit cellular signals over a large geographic area—carrying the voice and data that people send and receive on their wireless devices.



## Fiber

Using pulses of light, fiber optic cables are the fastest and most efficient way to transmit wired or wireless data through both the public internet or private intranets.

## Small cells

Lower to the ground, and often attached to streetlights or utility poles, small cells add additional wireless coverage and capacity—or bring new coverage where towers aren't feasible.

# Smart City Applications

## SMART HOMES

Wireless technology and connected homes are giving many people remote access to security systems, cameras, light switches, thermostats, and more.

## WEARABLES

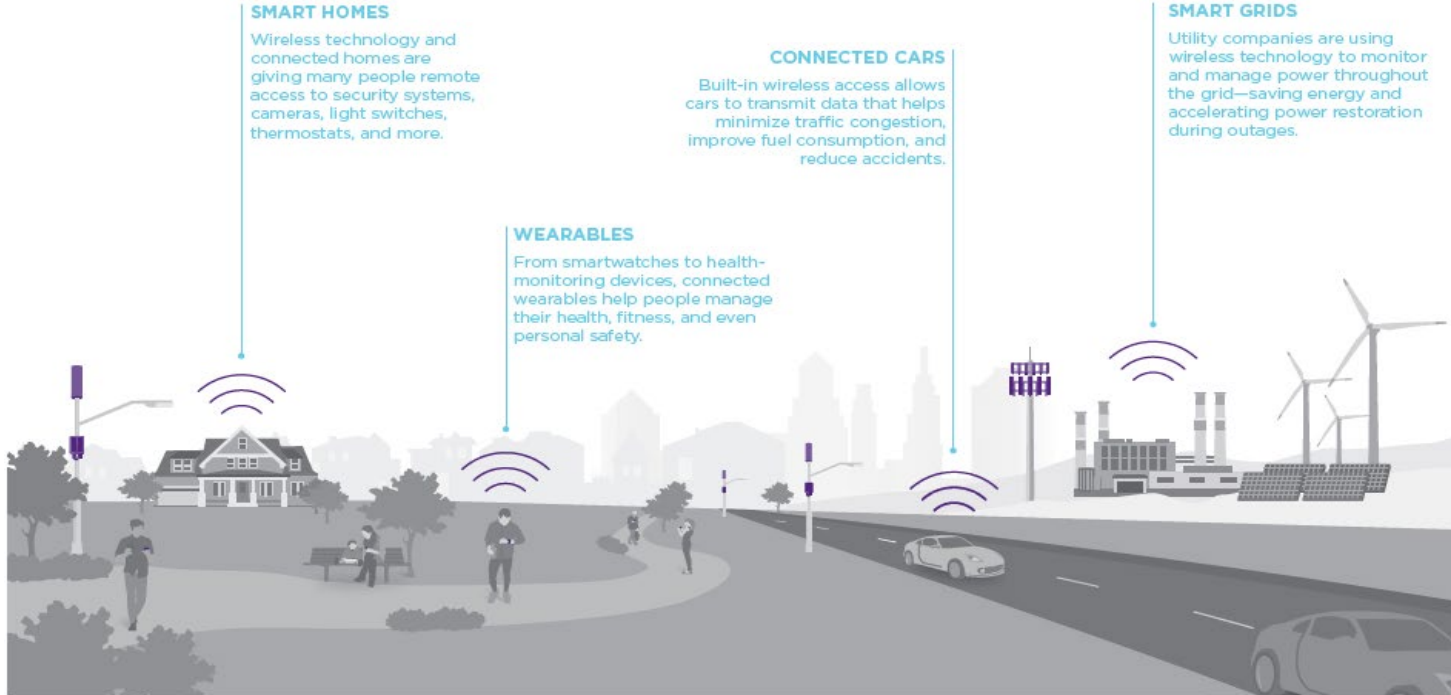
From smartwatches to health-monitoring devices, connected wearables help people manage their health, fitness, and even personal safety.

## CONNECTED CARS

Built-in wireless access allows cars to transmit data that helps minimize traffic congestion, improve fuel consumption, and reduce accidents.

## SMART GRIDS

Utility companies are using wireless technology to monitor and manage power throughout the grid—saving energy and accelerating power restoration during outages.



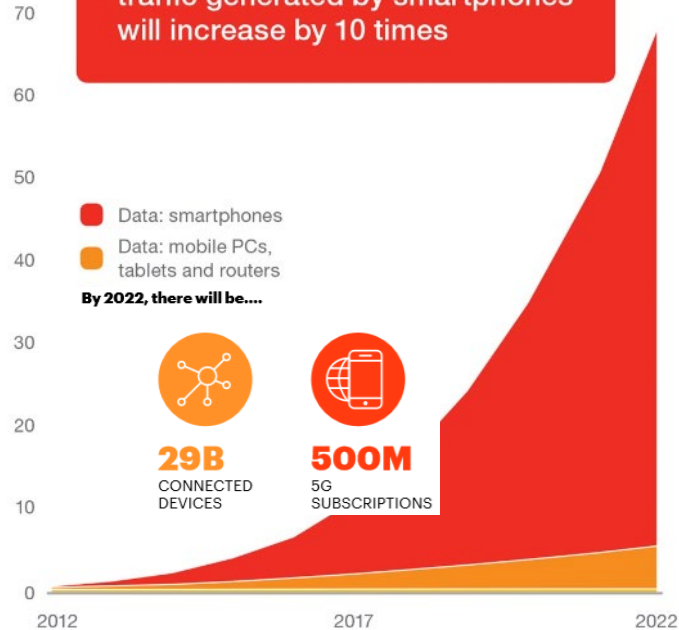
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# Data Consumption

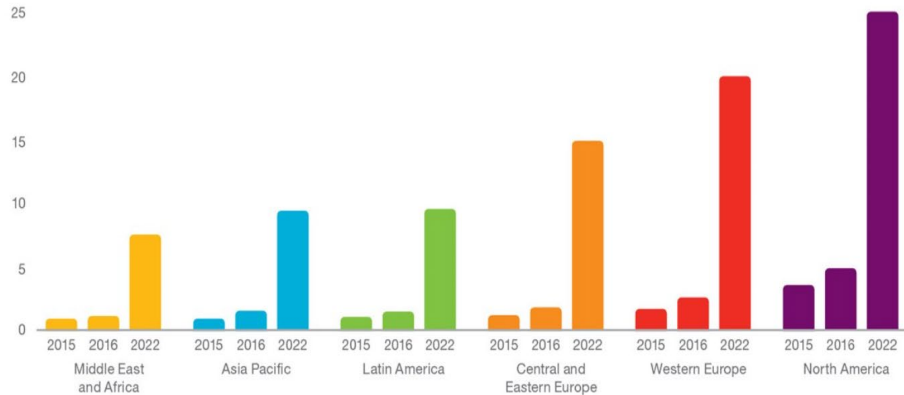


Between 2016 and 2022, the traffic generated by smartphones will increase by 10 times



1 Exabyte = 1 Billion Gigabytes

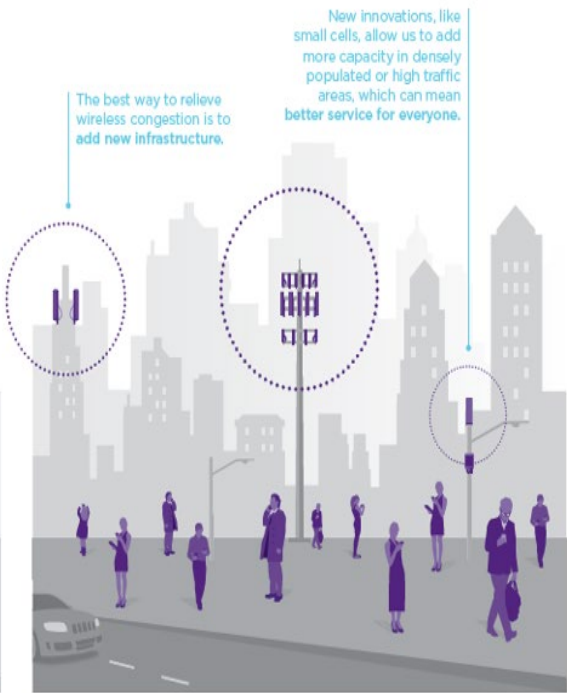
Data traffic per smartphone (GB per month)



# Data Congestion vs. Capacity

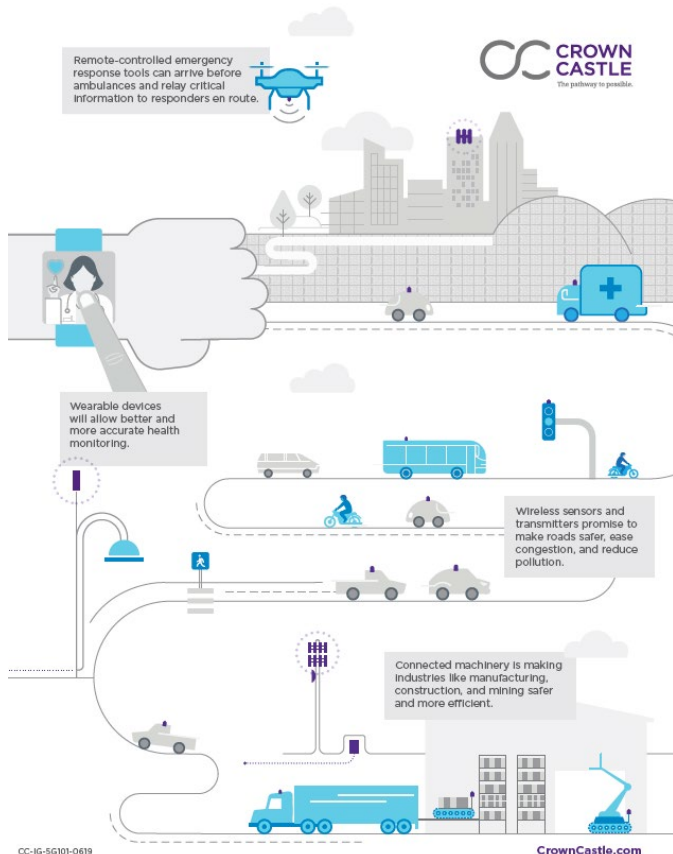


With increased data usage, all that extra demand can quickly overload a cell site's capacity.



New innovations, like small cells, allow us to add more capacity in densely populated or high traffic areas, which can mean better service for everyone.

CONGESTION vs. CAPACITY



# The transition to a 5G world.

**20X**  
**1gb/sec**

Speeds that are as much as **20x faster** than 4G, delivering data rates as high as **1 gigabit per second**.

**10,000X**  
**capacity/efficiency**

Speeds support a **10,000x increase** in traffic capacity and network efficiency.

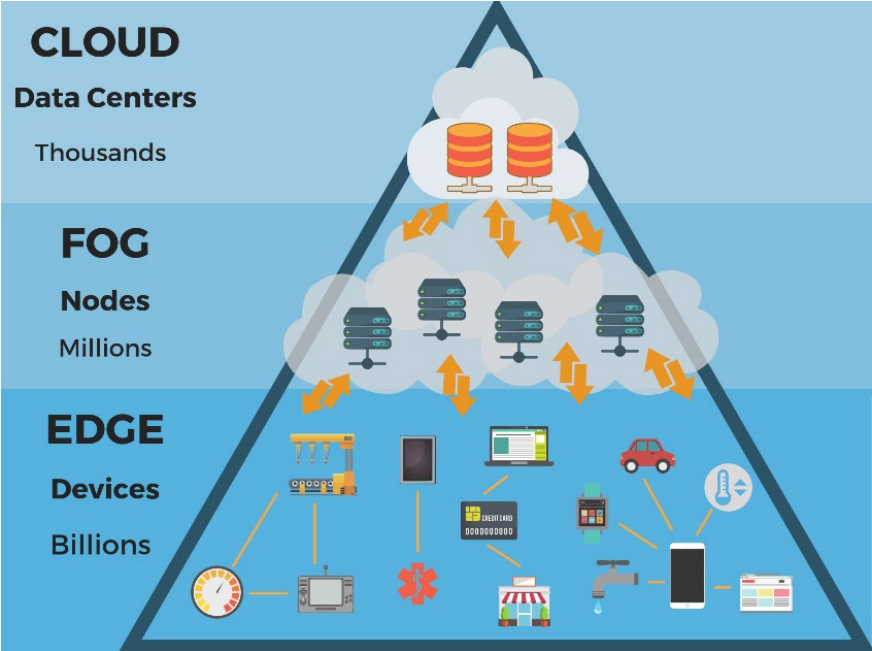
**10X**  
**decrease**

**10x decrease** in end-to-end latency—as low as **1 millisecond**—delivering more instantaneous and real-time access.

# Bringing the Network Closer



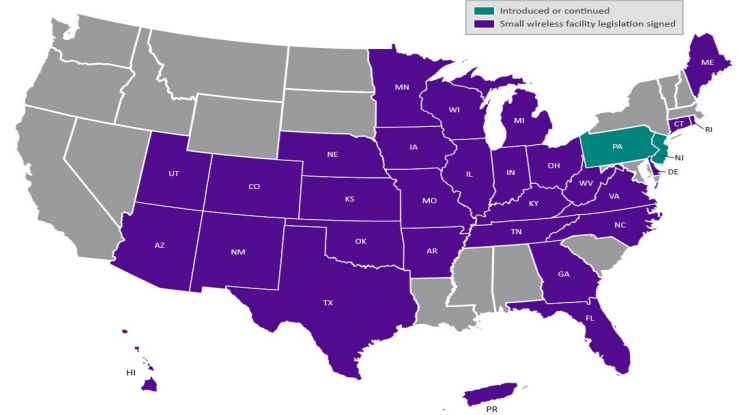
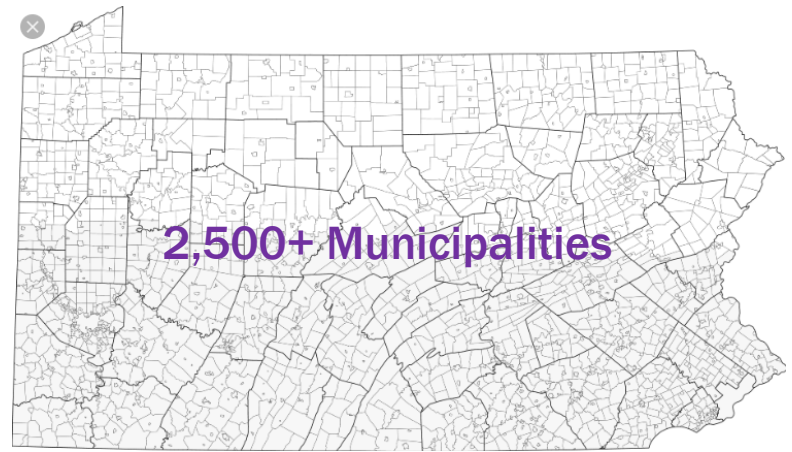
Small Cells



Edge Computing



# Industry Challenges & Opportunities



# Thank you

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