

5G- A Game Changer for Cx and Energy Management

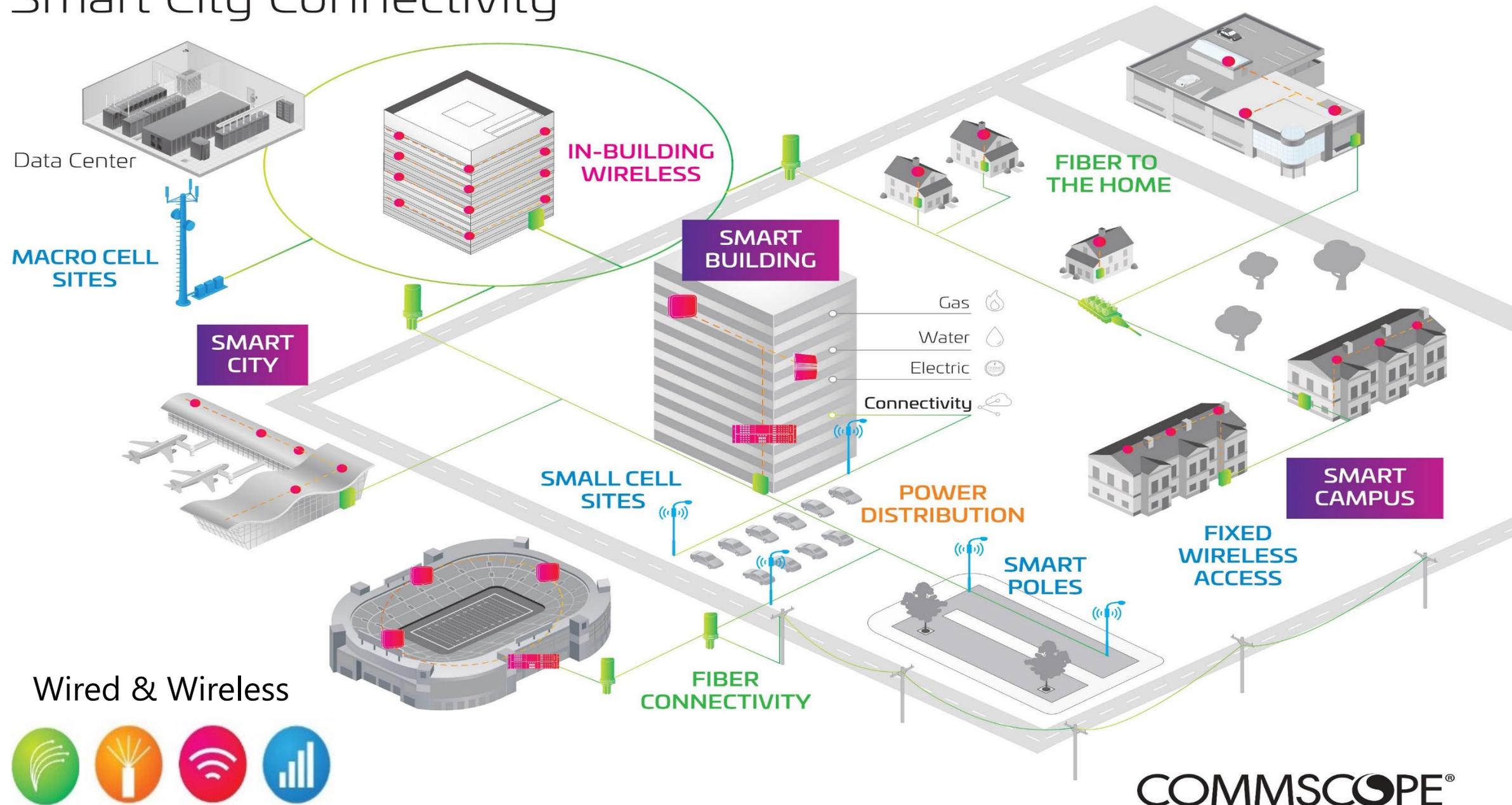
Steve Schmerber, RCDD/DCDC/NTS

Field Application Engineering



COMMSCOPE®

Smart City Connectivity





CONNECTIVITY IS EVERYWHERE.

IN AN INTERNET MINUTE



3.7 MILLION
GOOGLE SEARCHES



266,000 HOURS
NETFLIX VIDEO WATCHED



\$900,000 USD
SPEND ONLINE



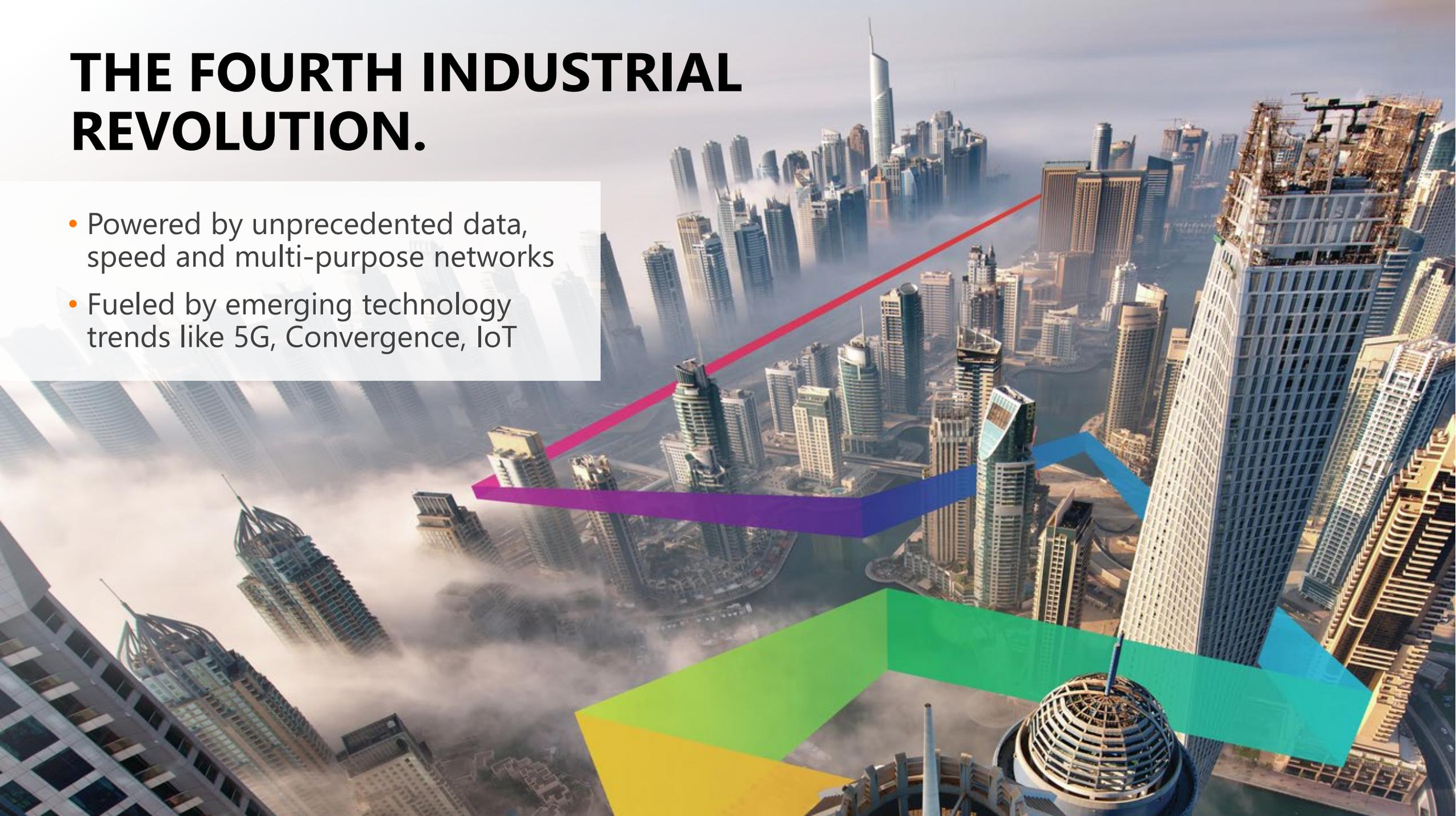
> 1 MILLION
SWIPES

Another Reality for Commissioning ?



THE FOURTH INDUSTRIAL REVOLUTION.

- Powered by unprecedented data, speed and multi-purpose networks
- Fueled by emerging technology trends like 5G, Convergence, IoT



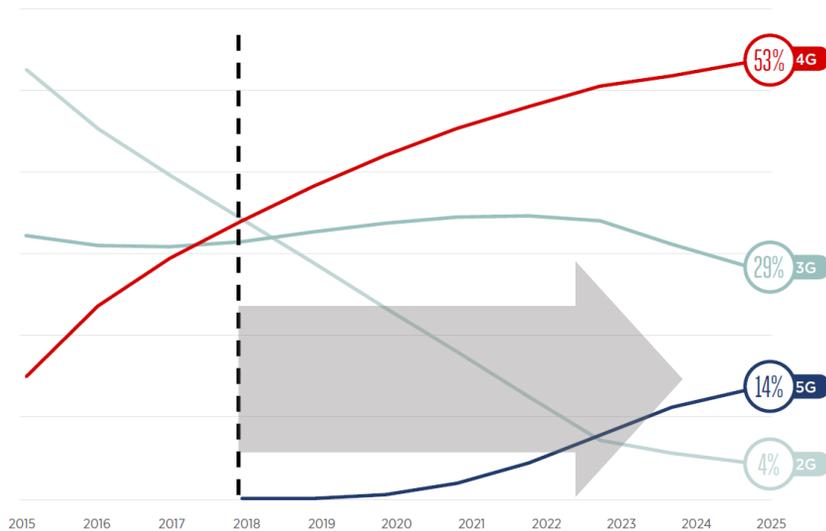
We're not done with 4G

Connections

Figure 6 Source: GSMA Intelligence

Global mobile adoption by technology

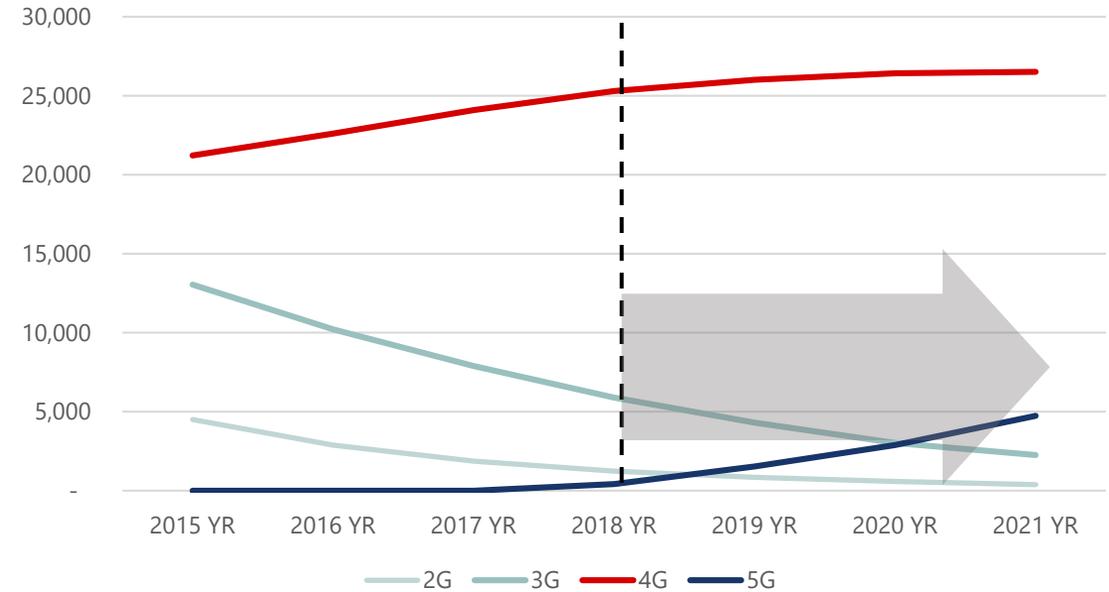
Share of mobile connections, excluding cellular IoT



Source: GSMA, *The Mobile Economy*, March 2018

Infrastructure

RAN Infrastructure Investment By Technology 2015-2021 (\$M)



Source: Gartner, *Communications Service Provider Operational Technology Worldwide*, December 2017

Continuing 4G build-out must be 5G-ready from day 1

5G The next network evolution is shaping up to be the next revolution

10GBPS THROUGHPUT PER USER

DENSER NETWORKS & SUPER-LOW LATENCY SPEEDS

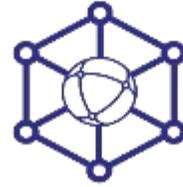
5G TRIALS AND PRE-STANDARD DEPLOYMENTS



5G will be a network of networks



1 Enhanced mobile broadband



2 Internet of things



3 Ultra-low latency

UP TO **10** GBPS PER SUBSCRIBER

1-7 TYPICAL GBPS PER SUBSCRIBER

10-100x CONNECTED DEVICES

MORE THAN **20** BILLION THINGS

1,000x MORE BANDWIDTH

5x LOCATION DENSITY

LESS THAN **5** MILLISECONDS

5% OF 4G

Data Centers— the brain of a smart community



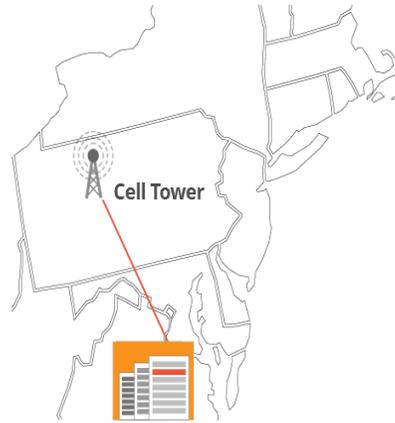
Big data applications are driving:

- Speed & Size
- Microservices
- Location (moving to Edge)



Current: 4G

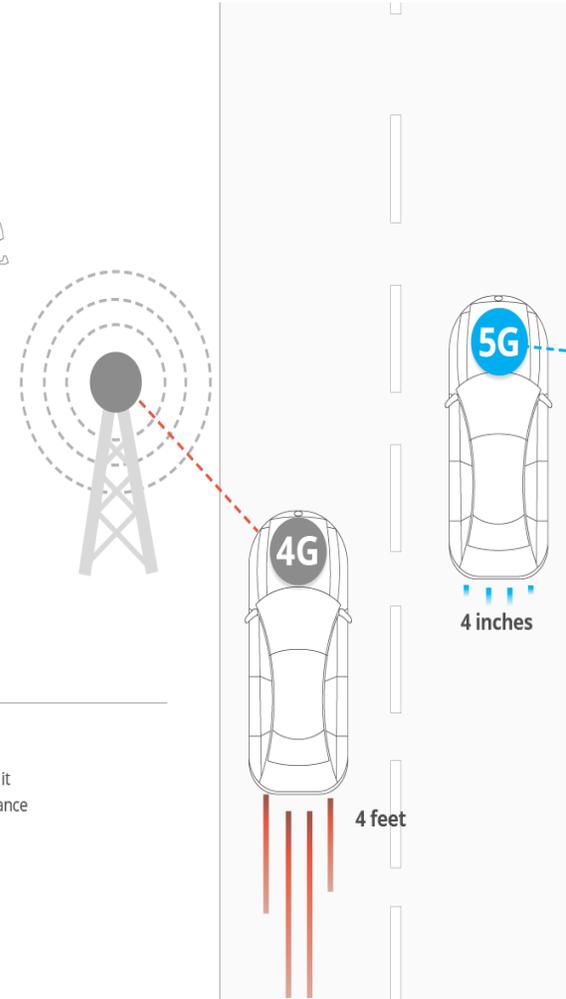
Only a few large centralized data centers



Cloud Data Center
More than 500 miles away

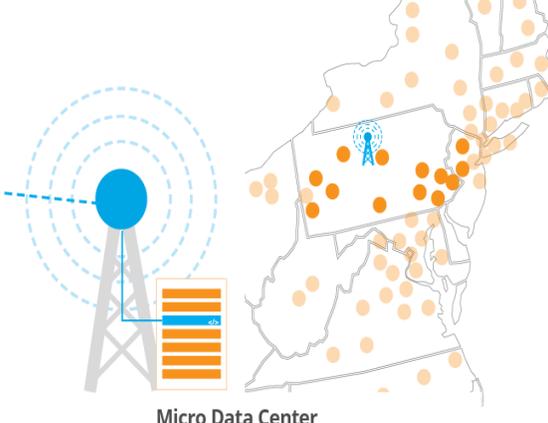
> 80 ms latency

The car moved **over four feet** by the time it received a response due to the large distance from the data center.



Upcoming: 5G

Thousands of new micro data centers under cell towers



Micro Data Center
Less than 5 miles away

< 5 ms latency

The car moved **less than four inches** by the time it received a response, thanks to the close distance to the Micro data center.

Current: 4G
Only a few large centralized data centers



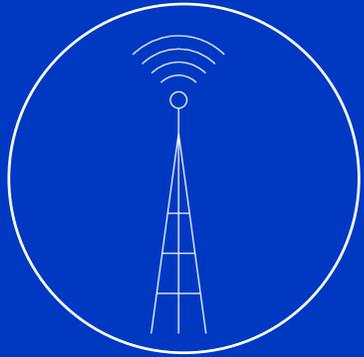
Upcoming: 5G
Thousands of new micro data centers under cell towers



Current Large Data Centers vs. Micro Data Centers near cell towers

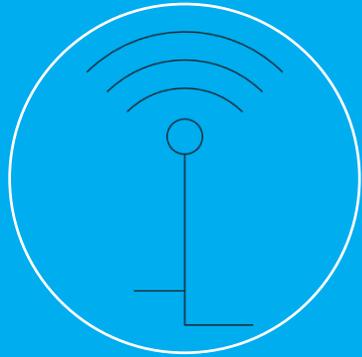
Latency differences between 4G & 5G infrastructure, with supportive use case — Source: [Mutable.io](https://mutable.io)

Building the foundation for 5G



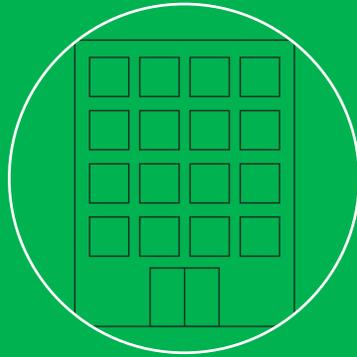
Macro Cell Sites

- Antenna and RF path solutions
- Higher frequency bands
- Higher-order MIMO



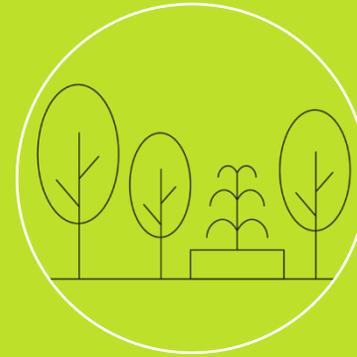
Metro Cell Sites

- Densification enabler: antennas, concealment, power, connectivity
- Smart city enabler



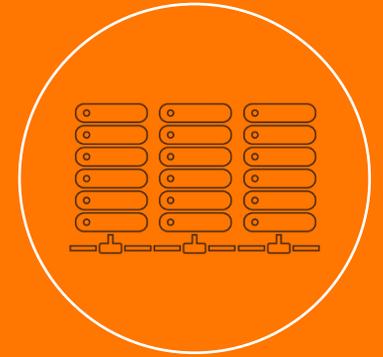
In-building

- Small cell and DAS on IT infrastructure
- Connectivity and PoE power distribution and management
- Automated infrastructure management



Outside Plant

- Cloud RAN enablement
- High-speed fiber connectivity
- Powered fiber



Data Centers and Central Offices

- High speed fiber connectivity with intelligence
- Edge data centers
- CO/ DC convergence



A nighttime photograph of a city street, likely in Hong Kong, featuring a prominent skyscraper (the Bank of China Tower) in the background. The street is filled with light trails from cars, and an elevated walkway or bridge structure is visible on the left. The scene is illuminated by streetlights and building lights, with a full moon visible in the dark sky.

A brighter future
is built on smarter
networks

Thank YOU!

CX
ENERGY
2019
CONFERENCE & EXPO