



# Welcome to the 5G age

Cristiano Amon

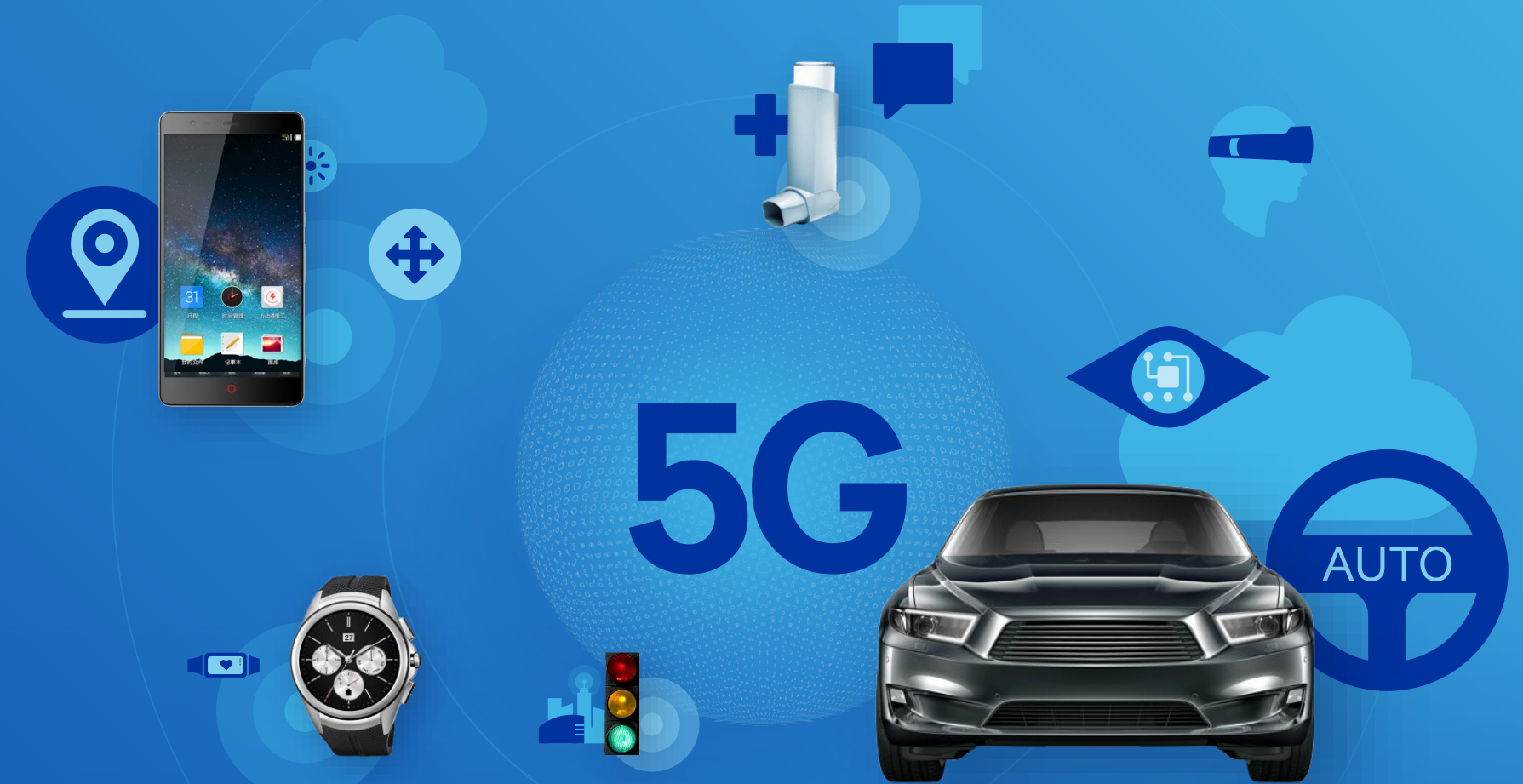
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and President, Qualcomm CDMA Technologies

October 2017

@cristianoamon



# Mobile technology is powering the global economy



**\$12 Trillion** in goods and  
services by 2035\*

Source: The 5G Economy, an independent study from IHS Markit,  
Penn Schoen Berland and Berkeley Research Group, commissioned by Qualcomm



# Meeting the soaring demand for data

Mobilizing 5G NR enhanced mobile broadband for smartphones in 2019

30x

Growth in mobile data traffic (2014-2020)





World's first announced  
5G data connection  
on a 5G modem chipset  
for mobile devices

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Qualcomm® Snapdragon™

**X50**  
5G modem family

# Making 5G NR a commercial reality

Preparing for 2019 deployments

## 5G NR

Standards

## 5G NR

Interoperability testing  
and trials

LTE foundational technologies



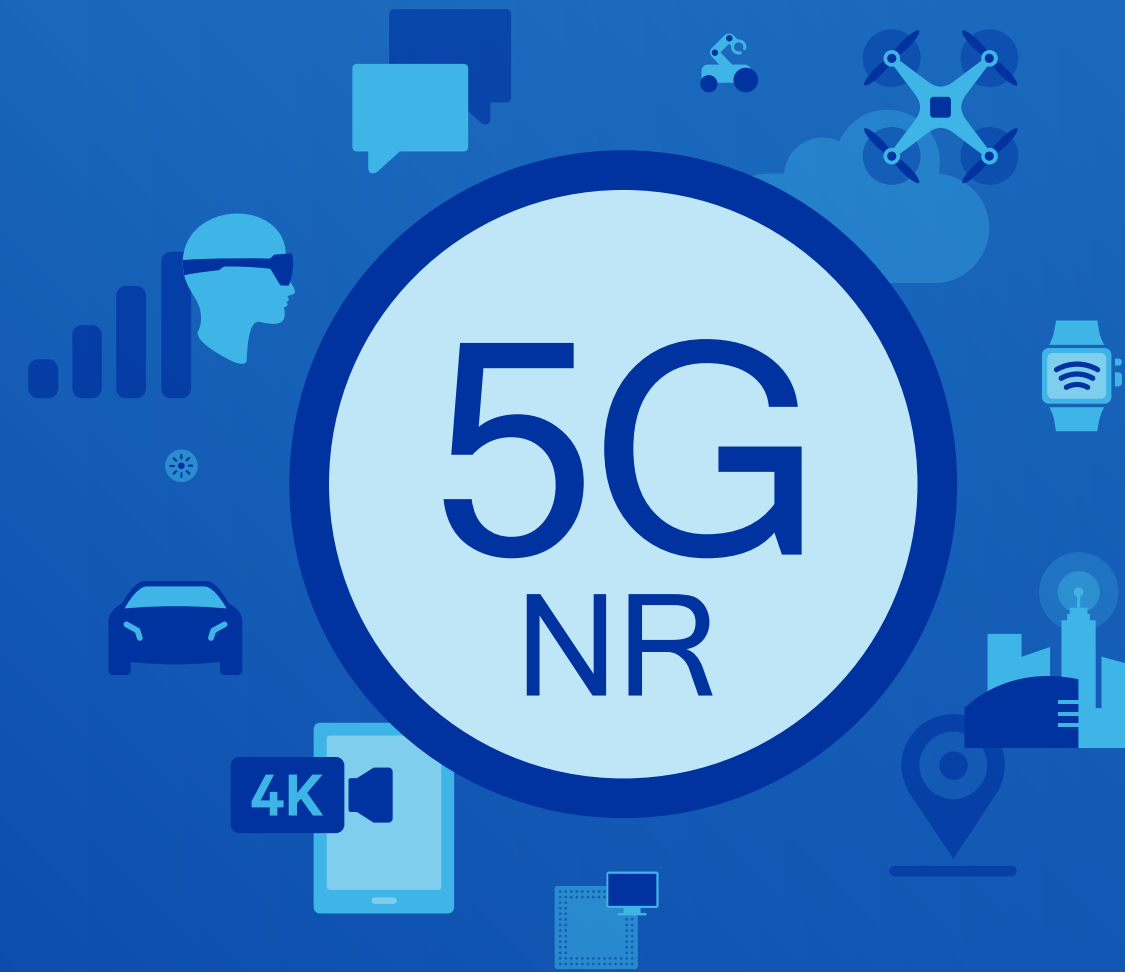
## 5G NR

Standards-compliant  
products



# Leading the way on 3GPP-compliant trials 5G NR

In collaboration starting 2nd  
half of 2017 with...



Interoperability testing and trials  
at sub-6 GHz and mmWave

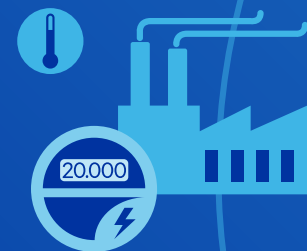


# Complexity of mobile RF systems is accelerating

5G impacts RF Front End design

Source: Qualcomm Technologies, Inc. internal analysis

Many more spectrum bands/types



More diverse deployment scenarios



Advanced wireless technologies



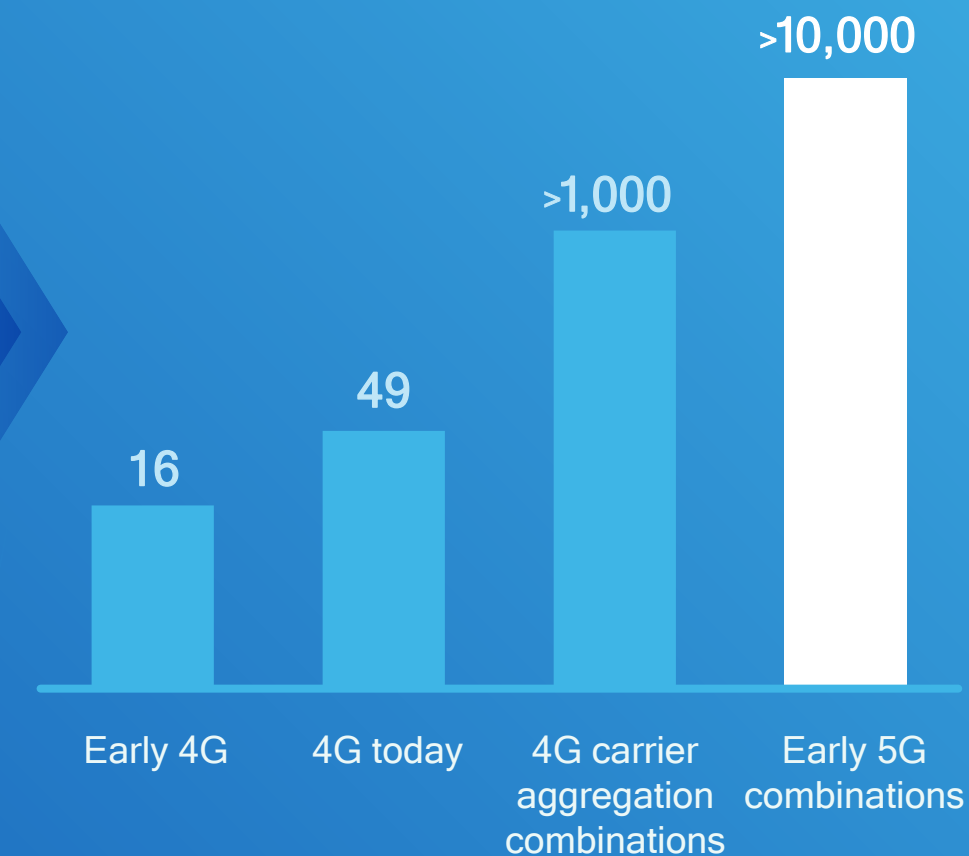
A much wider variation of use cases



# 5G

## Number of RF bands and band combinations

By technology generation



# 5G NR

in a smartphone?

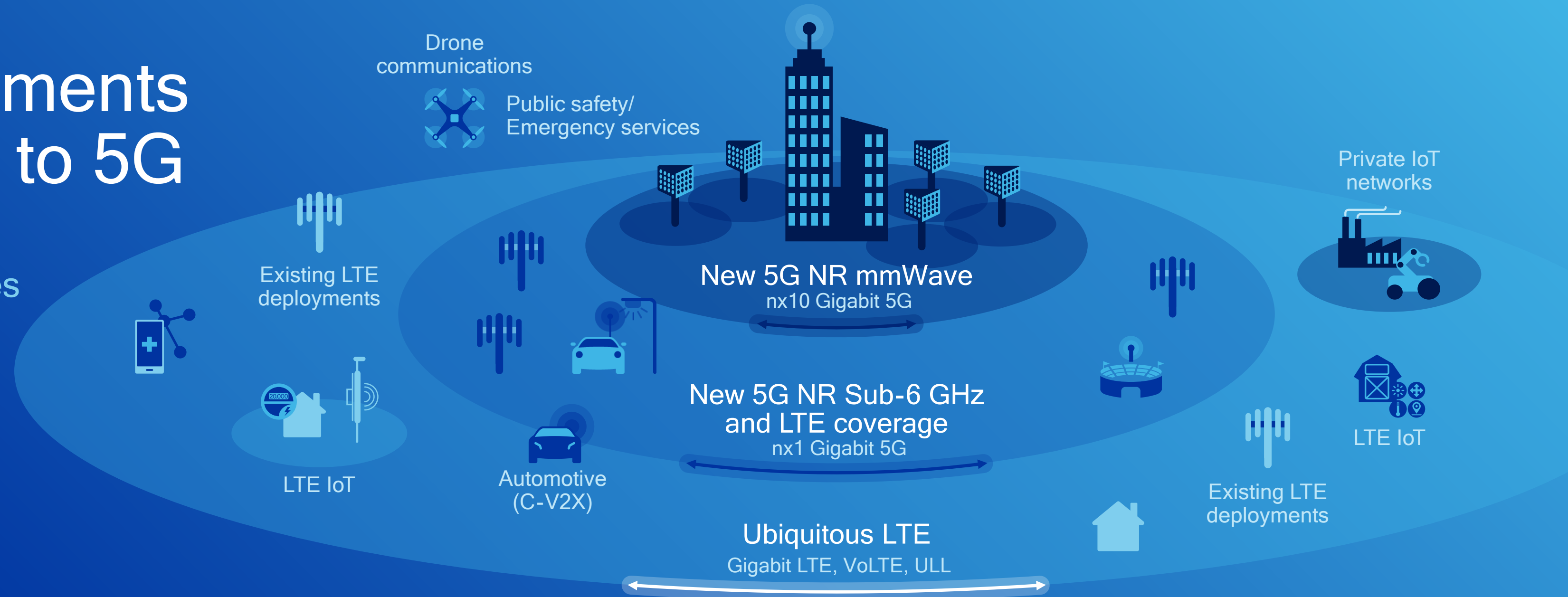


Challenge accepted



# LTE advancements are essential to 5G

Foundational technologies  
enable expansion of  
mobile ecosystem





# Gigabit LTE

Faster connections  
in congested areas\*



Make the most  
of unlimited data



Epic speed for connected  
apps, cloud access to files



Double the antennas  
for a strong signal



\*Based on the use of 4x4 MIMO, 256-QAM and LTE-U/LAA technology, which increase network capacity in dense areas



A stylized world map in shades of blue serves as the background for the entire graphic. The map is centered, showing the continents of North America, South America, Europe, Africa, Asia, and Australia. The colors range from a deep navy blue to a lighter sky blue.

Gigabit LTE

# Global phenomenon

40

Operators

1.2B

Connections served

24

Countries planned or trialed

Source: Qualcomm Technologies internal analysis, GSA "Snapshot: LTE-Advanced Networks including LTE-Advanced Pro" report, May 2017, GSMA Intelligence, Sept. '17



# Gigabit LTE. Only on Android.



Sony  
Xperia XZ  
Premium



Samsung  
Galaxy  
S8/S8+



HTC  
U11



Moto  
Z<sup>2</sup> Force  
Edition



Asus  
Zenfone 4  
Pro



Samsung  
Galaxy S8  
Active



Samsung  
Galaxy  
Note 8



Sharp  
Aquos R



LG  
V30



Sony  
Xperia  
XZ1

Great apps are even  
better with Gigabit LTE



Google Drive



Google Photos



YouTube



Google Play Music



# Mobile technology is transforming industries

4G, 5G and connectivity convergence



Automotive



Mobile PC



IoT



Networking



# Future of automotive

Intelligently connected  
Increasingly electric  
Efficiently shared  
Increasingly autonomous



Heavy traffic  
Warning!

Left turn  
in 1.8 miles

2:34 74°F May 9

Surround view

Driver falling asleep!  
Heart rate low

BODY TEMPERATURE  
Average

HEART RATE  
Low

RESPIRATORY RATE  
Normal

Rock of London  
No Hype  
War of the Guitars

24 minutes  
To Mom's house

Worldwide patent portfolio  
(Pending and granted)



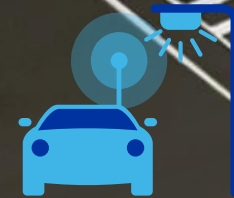
PARTICIPANTS:



Liverpool	0	Swansea City	1
Southampton	0	Everton	0
Chelsea	3	Arsenal	2
Middlebrough	0	Man United	0



# Connecting vehicles to everything with Cellular V2X



Vehicle-to-infrastructure



Vehicle-to-vehicle



Vehicle-to-network



Vehicle-to-pedestrian



# Meet the Always Connected\* PC

 Windows 10

 QUALCOMM®



Beyond all-day  
battery life



Virtually always on,  
always connected\*



Sleek, innovative  
designs



The Windows 10  
you know

\*Requires Network Connection



Qualcomm Technologies is at the  
heart of the IoT ecosystem

>1.5 Billion

IoT devices shipped using  
Qualcomm Technologies' chips\*

\*Qualcomm Technologies, Inc. data, as of May 23, 2017; Includes products from Qualcomm Technologies, Inc. and Qualcomm Technologies International, Ltd..

# Expanding the mobile ecosystem with LTE IoT

Over 20 mobile operators committed to deploy Cat-M1 and/or Cat-NB1 networks

## Cat-M1 (eMTC)

Higher throughput, mobility, VoLTE

## Cat-NB1 (NB-IoT)

Lower cost, larger coverage, 2G migration

Wearables



Energy management



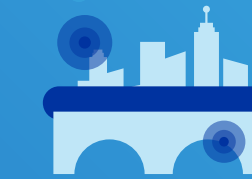
Voice (VoLTE)



Connected healthcare



Object tracking



City infrastructure



Utility metering



Environment monitoring



Smart buildings



# Transforming connectivity in the home



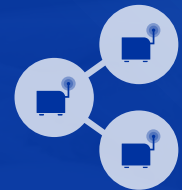


# Advancing the mesh Wi-Fi revolution

Bringing mesh networks to broadband carriers



Facilitating first step to a wireless broadband reality




Creating a carrier-grade mesh platform





Leading the world to

5G

The image is a horizontal banner with a blue background. On the left, the text "Leading the world to" is written in white. In the center-right, a large dark blue circle contains the text "5G" in white. Surrounding this central circle and the text are various white and light blue icons: a drone, an eye, a location pin, a city skyline, a server rack, a person wearing a VR headset, a gear, and a circular arrow icon. The background also features faint, large-scale circular patterns.

# Thank you

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