



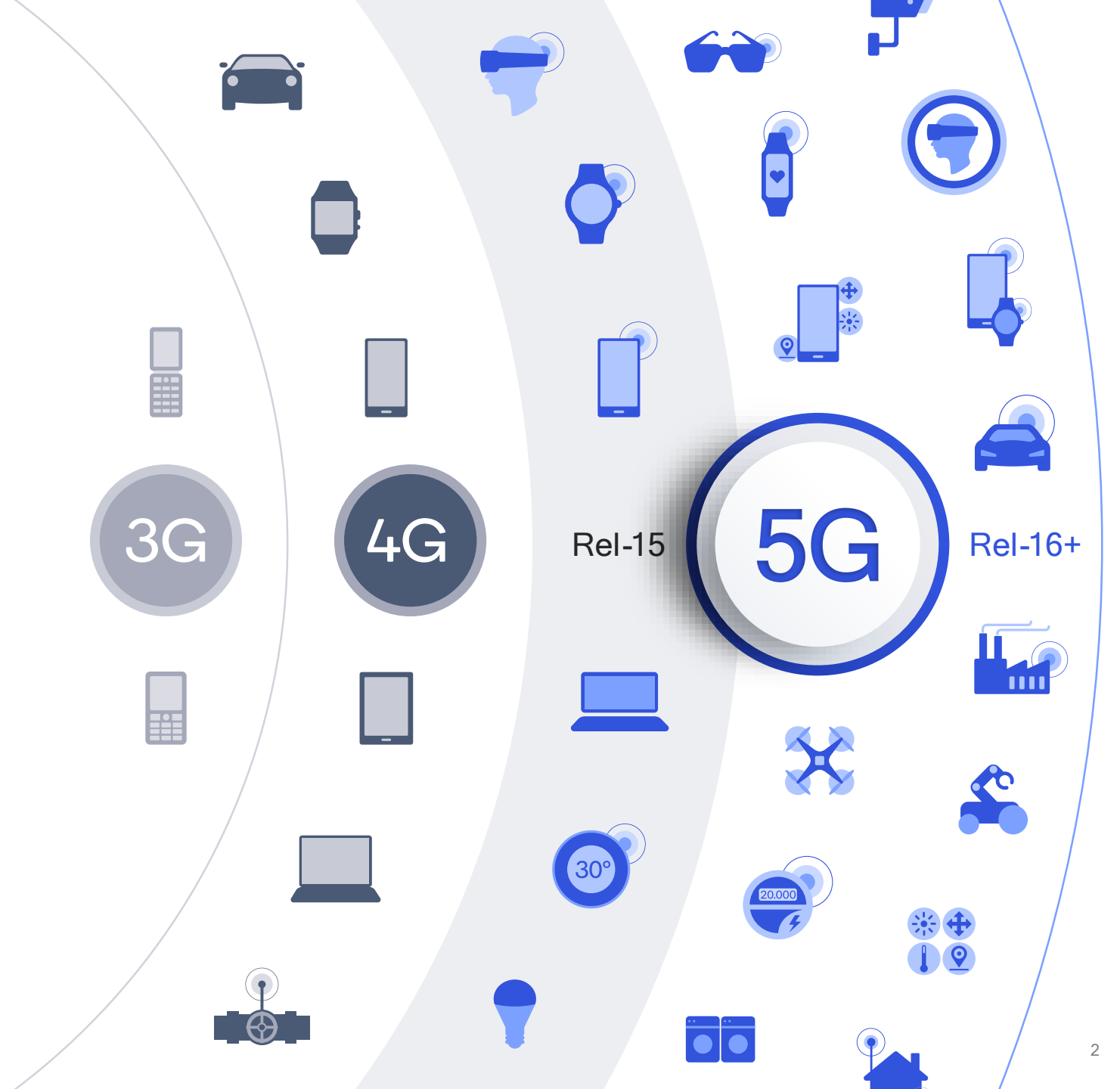
Qualcomm

Transforming the wireless edge to
realize the full potential of 5G

Learn more at www.qualcomm.com/5G

Leading society to 5G

And the expansion of the 5G ecosystem



A unifying connectivity fabric for society

Like electricity, you will just expect it everywhere



Multi-gigabit speed

Scalable to extreme simplicity

Ultra-low latency



Virtually unlimited capacity



Extreme reliability

On-device intelligence



Enabler to the factory of the future



Safer, autonomous transportation



Reliable access to remote healthcare



Precision agriculture



Efficient use of energy and utilities



Private networks for logistics, enterprises, industrial,...



Sustainable smart cities and infrastructure



Digitized logistics and retail



5G will expand the mobile ecosystem to new industries

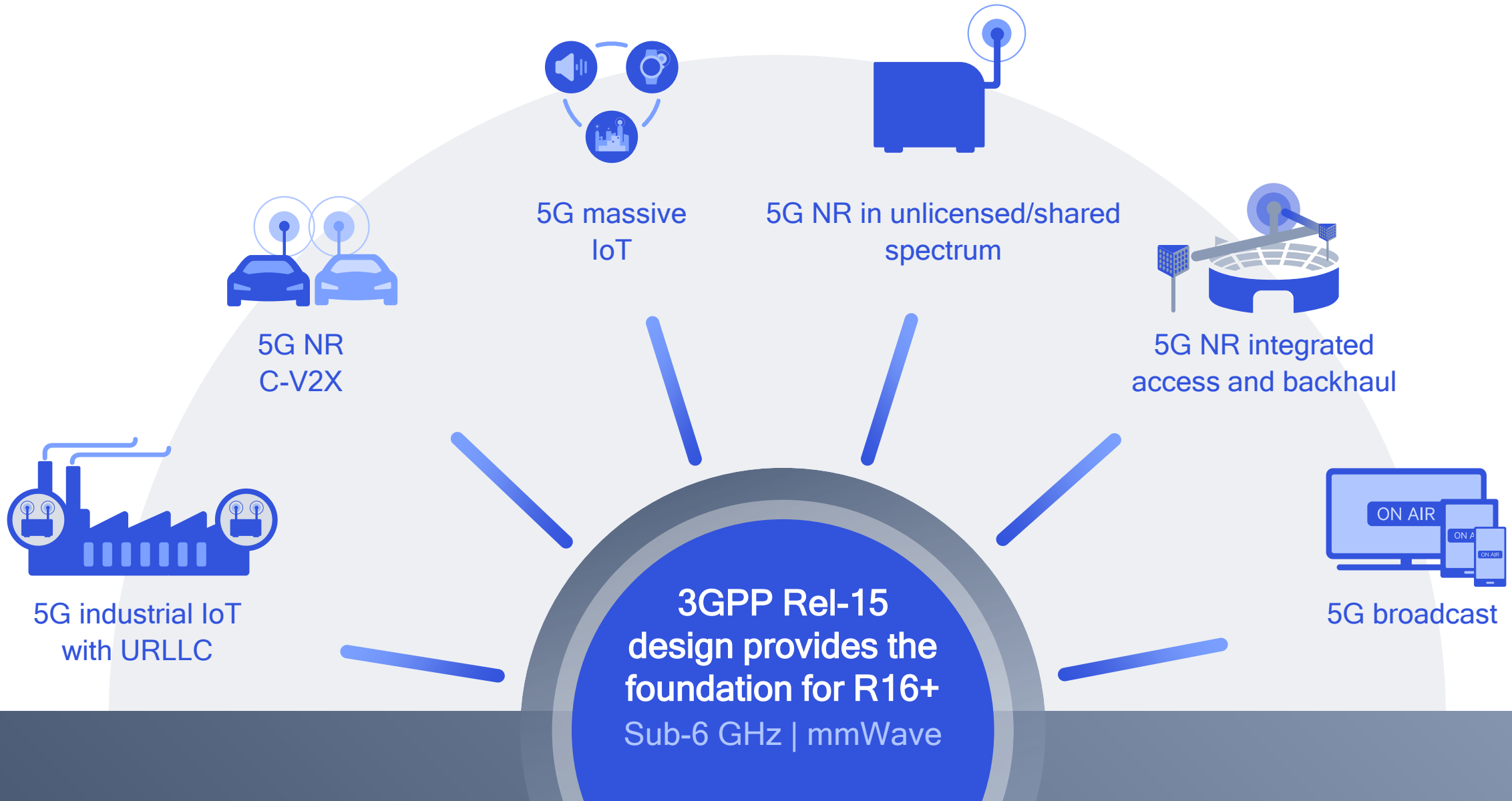
Powering the digital economy

>\$12 Trillion

In goods and services by 2035*

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

Driving a rich 5G roadmap in Release 16 and beyond



Private 5G networks for Industrial IoT use cases

Optimizing LTE today



New opportunities with 5G NR



Ultra-reliable
low-latency



Time-sensitive
networking



mmWave and
sub-6GHz eMBB



Wireline ethernet
replacement

Optimized

Tailored for industrial applications,
e.g., QoS, latency

Dedicated

Local 'edge' network, easy to
deploy, independently managed

Secure

Industrial grade security
with LTE and 5G NR



Container ports



Oil refineries



Manufacturing



Construction



Mines



Warehouses



Wind farms



Oil rigs

>\$5 Trillion¹

Global economic output in 2035 enabled by 5G in the following five categories



Manufacturing
\$3,364B



Transport
\$659B



Construction
\$742B



Utilities
\$273B



Mining
\$249B

1. "The 5G economy: How 5G technology will contribute to the global economy" by IHS Economics / IHS Technology

Enabling reliable wireless IoT connectivity at transport hubs



Shipping logs

Trip times

Cargo loads

Local management
for low latency
and protection of
sensitive data

Reliable robotic control

UHD
surveillance

Reliable,
autonomous
AGVs

On-premise
compute and storage
Updating

Real-time
asset tracking

At port (Days)

3

Location



Spoils shipped



Camera



On-device
intelligence

Real-time inventory

- Lumber
- Hardware
- Technology
- Manufacturing
- Produce
- Automotive
- Earth/Soil
- Retail

AR-guided execution

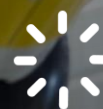
5G NR
Private network

Seamless interworking
with public network

The reconfigurable factory of the future will thrive on the wireless edge



XR Guided execution



Ultra reliable, low-latency wireless connection



Dynamic factory reconfigurability



5G NR
Private network



Real-time supply chain visibility



Predictive maintenance



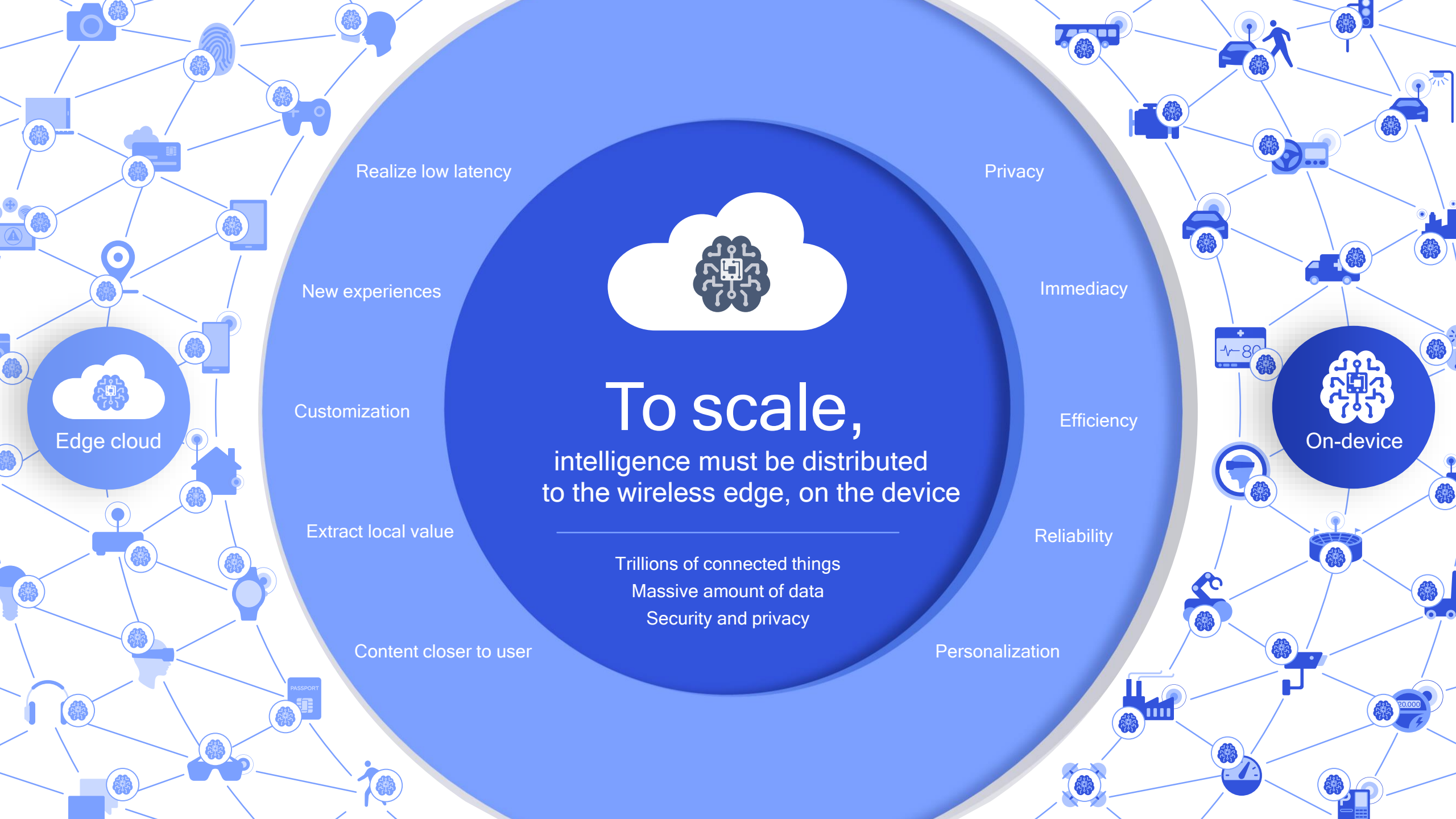
Surveillance





You don't want your device to confirm with the cloud to take action

On-device intelligence is key for today's and future autonomous cars



Instant access to media
and entertainment



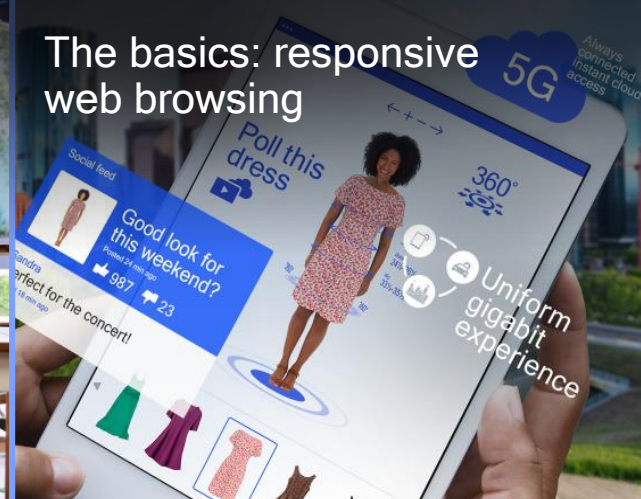
Connected cloud
computing



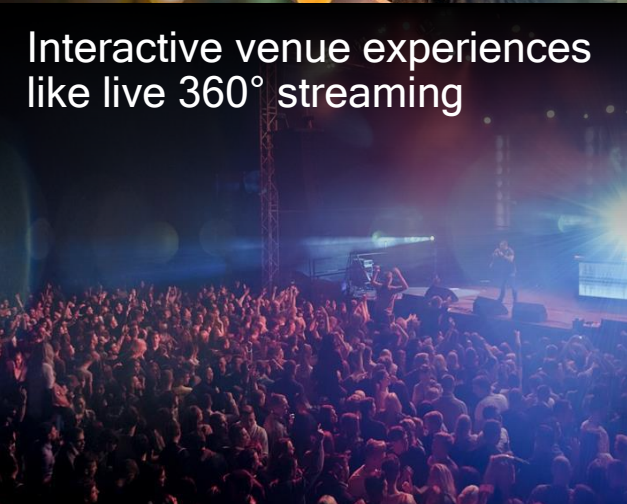
Low latency online
multiplayer gaming



The basics: responsive
web browsing



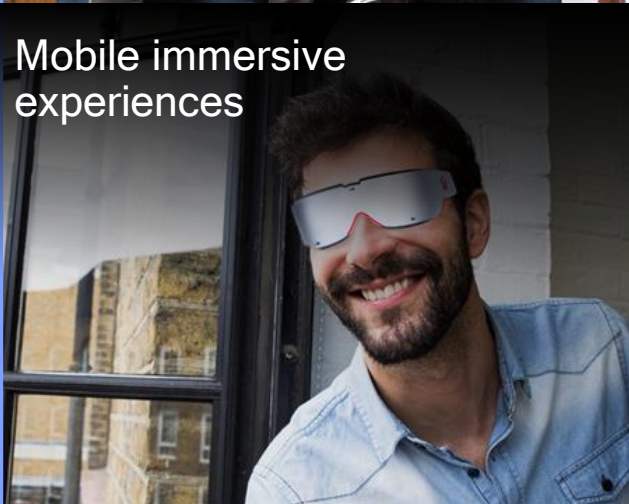
Interactive venue experiences
like live 360° streaming



Rich real-time user-generated
content, like video sharing



Mobile immersive
experiences



Distributed processing for
boundless photorealistic XR



5G

- Fiber-like data speeds
- Low latency
- Uniform performance
- Massive capacity

+

- Content/control closer to user
- Realization of low latency
- Customized local value
- Augment on-device processing

=

Enhanced and
entirely new
experiences

5G's capacity and latency for shared venue experiences



Augment on-device processing for boundless photorealistic mobile XR



A glimpse into the future – sleek and stylish XR glasses

How do we get there?

Bone conduction transducers

Directional speakers

Multimode connectivity
(4G, 5G, etc.)

Many passive and active cameras
with fisheye and telephoto lenses
Optoelectronic night vision
and thermal imaging sensors

Ambient light sensors

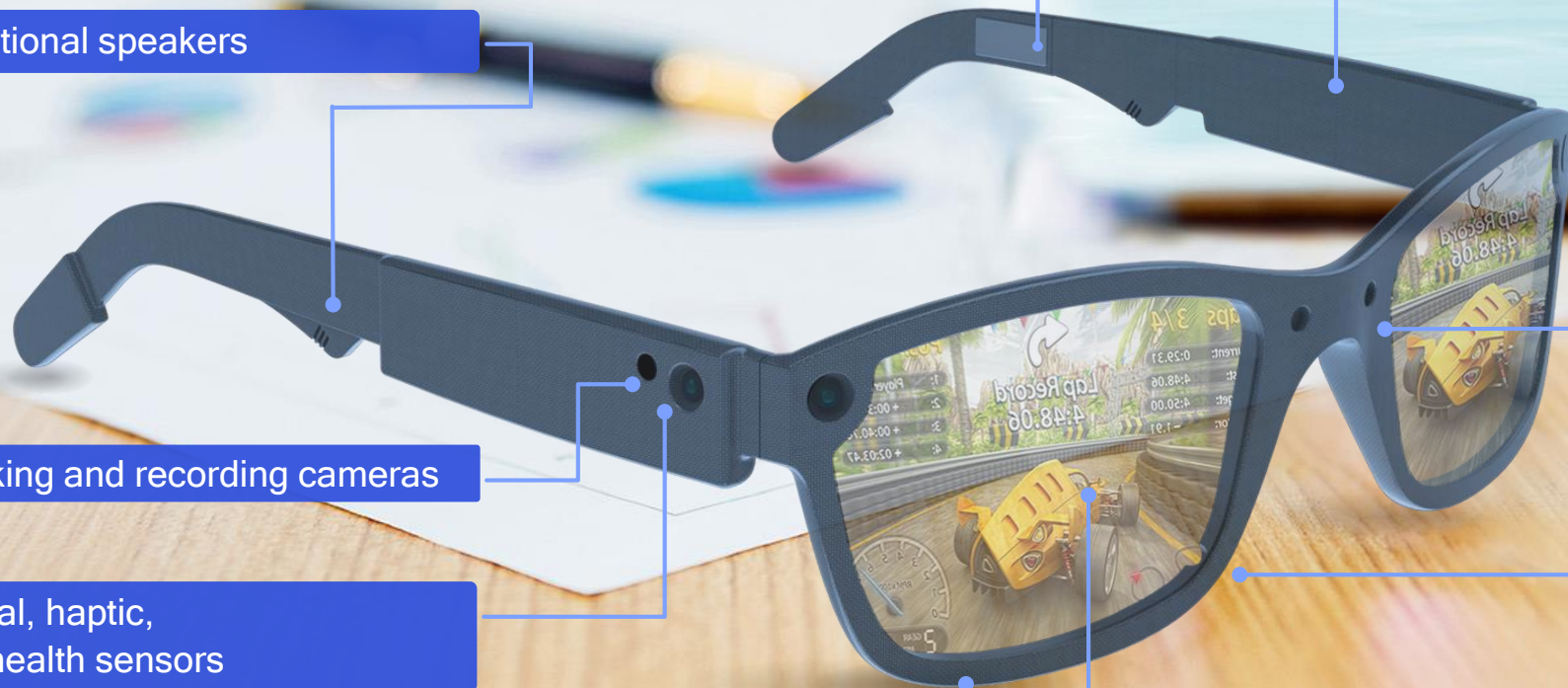
Tracking and recording cameras

Inertial, haptic,
and health sensors

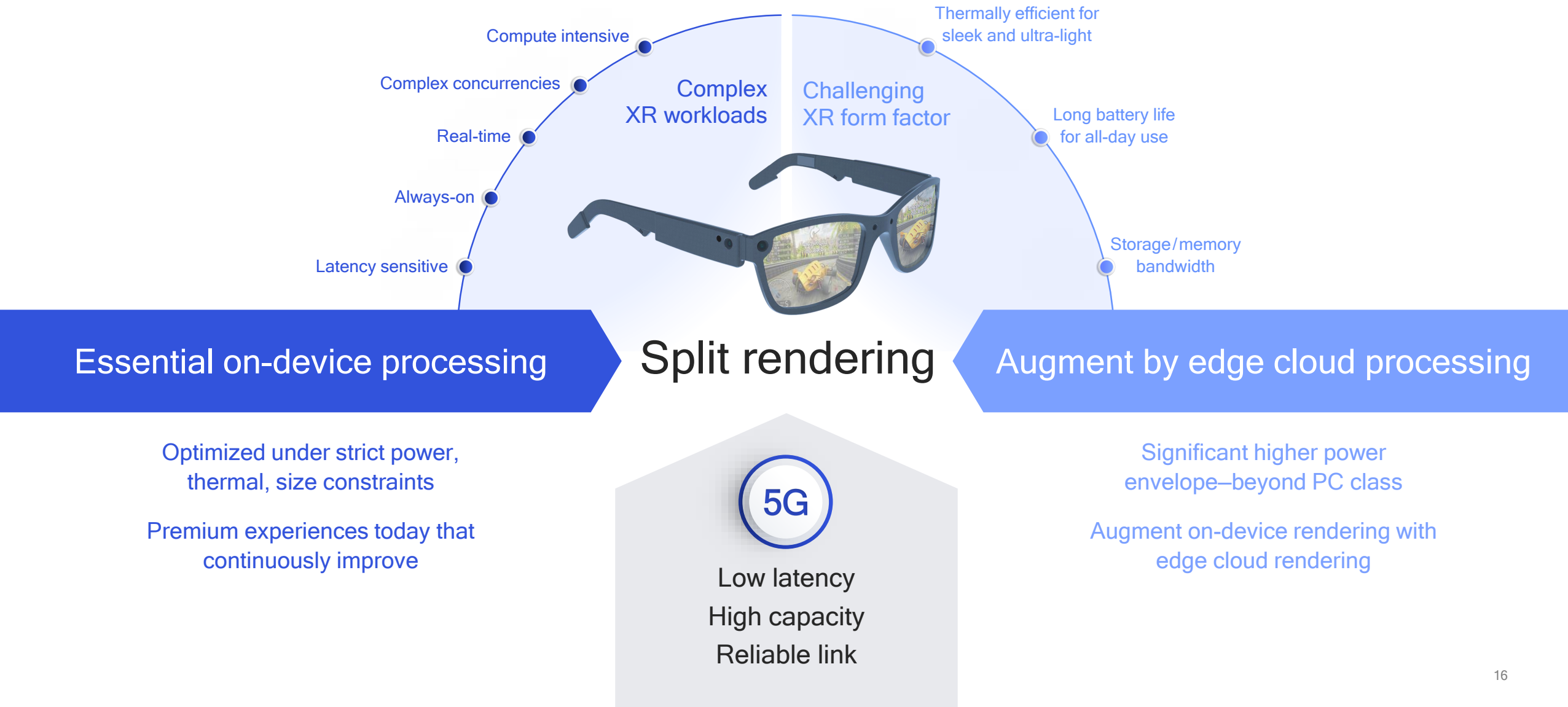
Multiple high sensitivity
audio microphones

Eye tracking cameras

New optics and projection
technologies within a durable,
semitransparent display



A new era in distributed processing



Voice is the transformative user interface (UI) we've been waiting for

Designed to be

Always-on
Conversational
Personal
Private

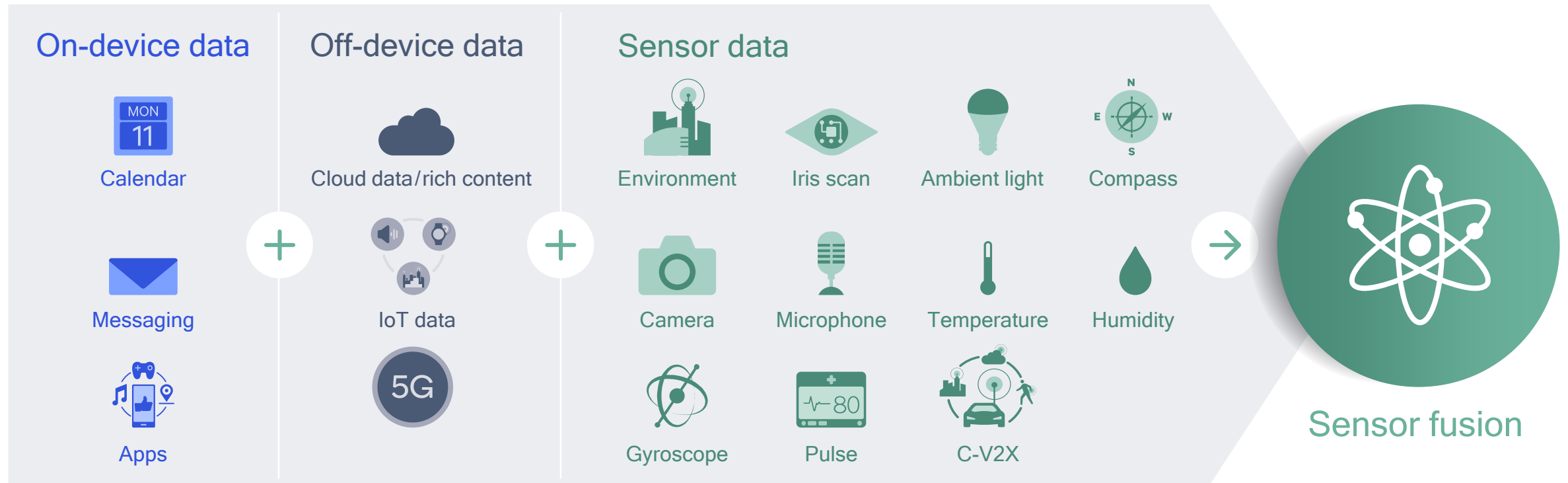
Critical to create a true virtual assistant



A context aware and personalized “digital me” sitting on the device



Contextual intelligence required for personalization



The local fusion of many types of sensors and personal information

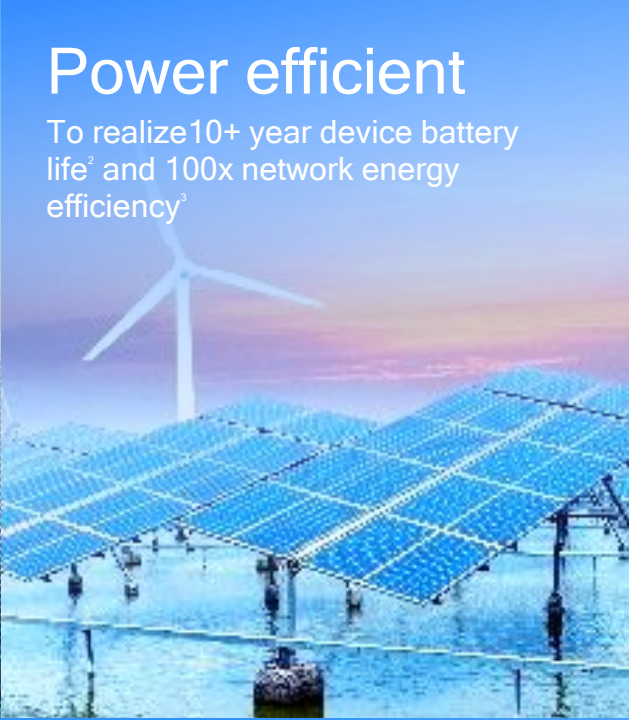
Massive scale

To efficiently support dense connections of 1+ million devices/km²



Power efficient

To realize 10+ year device battery life² and 100x network energy efficiency³



Long range

To reach challenging locations by achieving device link budget of 164 dB¹



Extreme simplicity

To allow scaling to the lowest-end use cases with e.g., single Rx antenna

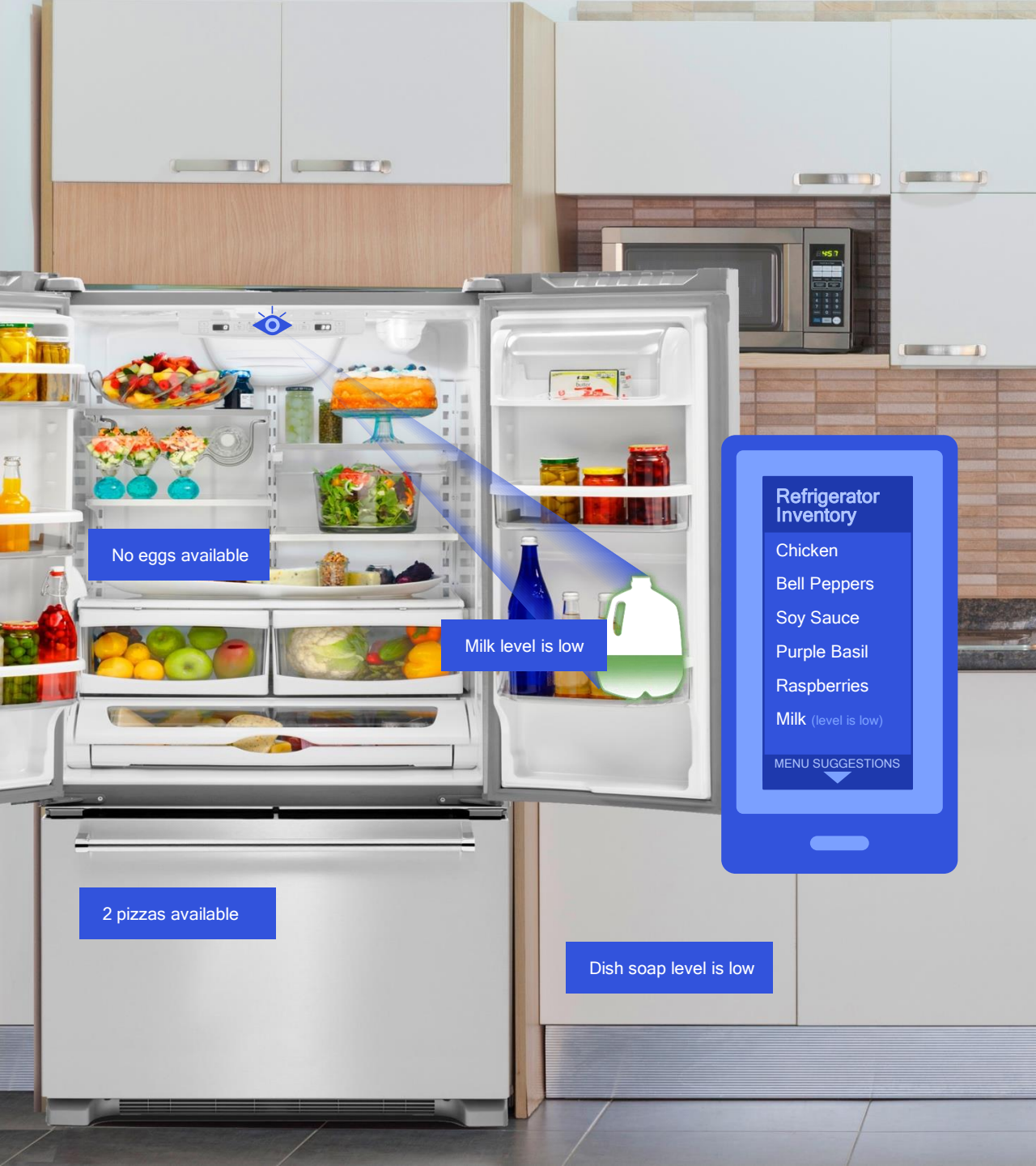


Scaling for the massive Internet of Things



Addressing growing needs of low-power, wide-area IoT use cases

1. Maximum Coupling Loss, assuming data rate of 160bps
2. Assuming 200B UL + 20B DL per day at 164 MCL with 5Wh battery
3. Compared to IMT-Advanced



AI in here. And everywhere.

Advanced camera processing, powerful machine learning, and computer vision at the edge will allow new applications that push the boundaries of our connected world.



Intelligent cameras monitor and track what's inside.



Local at the edge processing means low latency and max efficiency.






Neural networks watch and learn your preferences.



Ubiquitous connectivity helps you avoid running out of critical food supplies



Thank you!

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