

May 2018

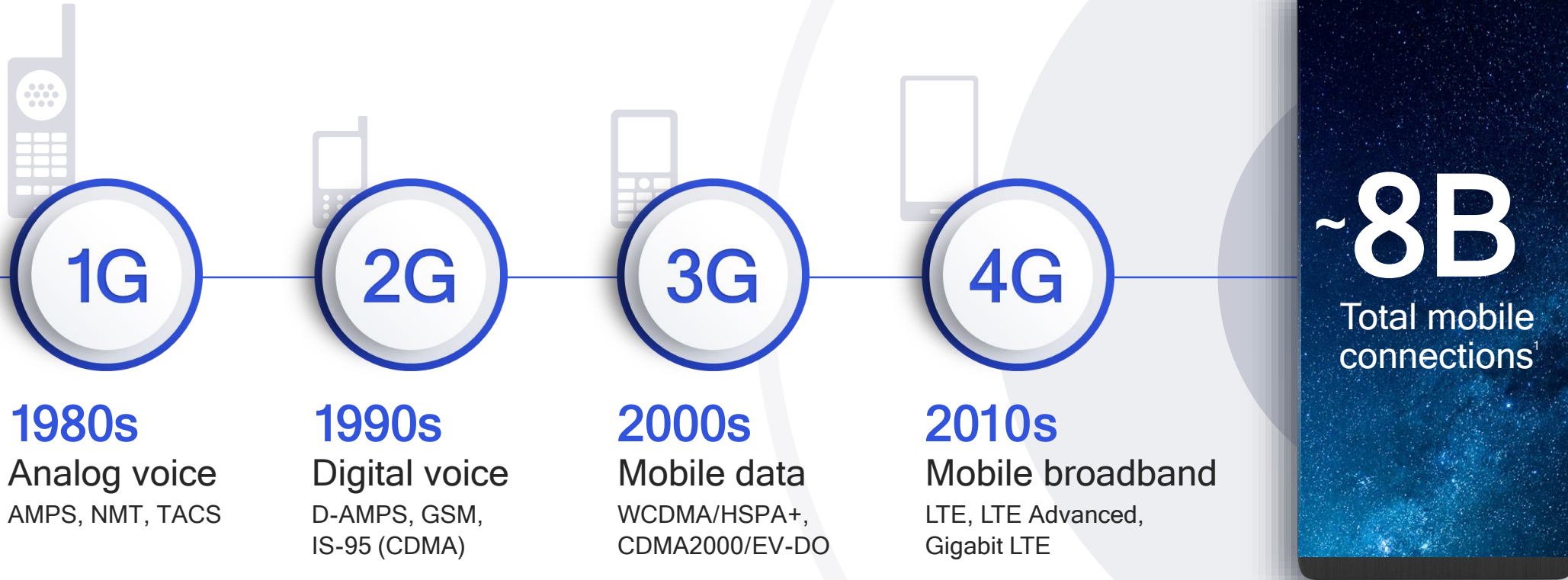
@qualcomm_tech

Qualcomm

Accelerating the mobile ecosystem expansion in the 5G Era with LTE Advanced Pro

Qualcomm Technologies, Inc.

Mobile is the largest technology platform in human history



More autonomous
manufacturing



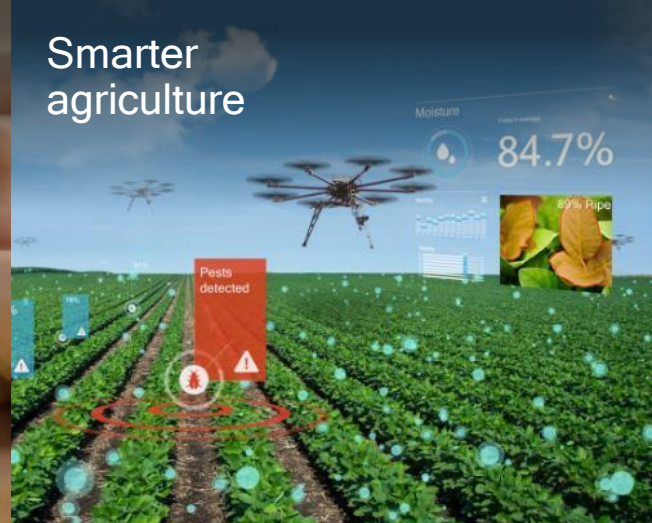
Safer, more autonomous
transportation



Reliable access
to remote healthcare



Smarter
agriculture



More efficient use
of energy and utilities



Improved public
safety and security



Sustainable cities
and infrastructure



Digitized logistics
and retail



5G

5G will expand the mobile ecosystem to new industries

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

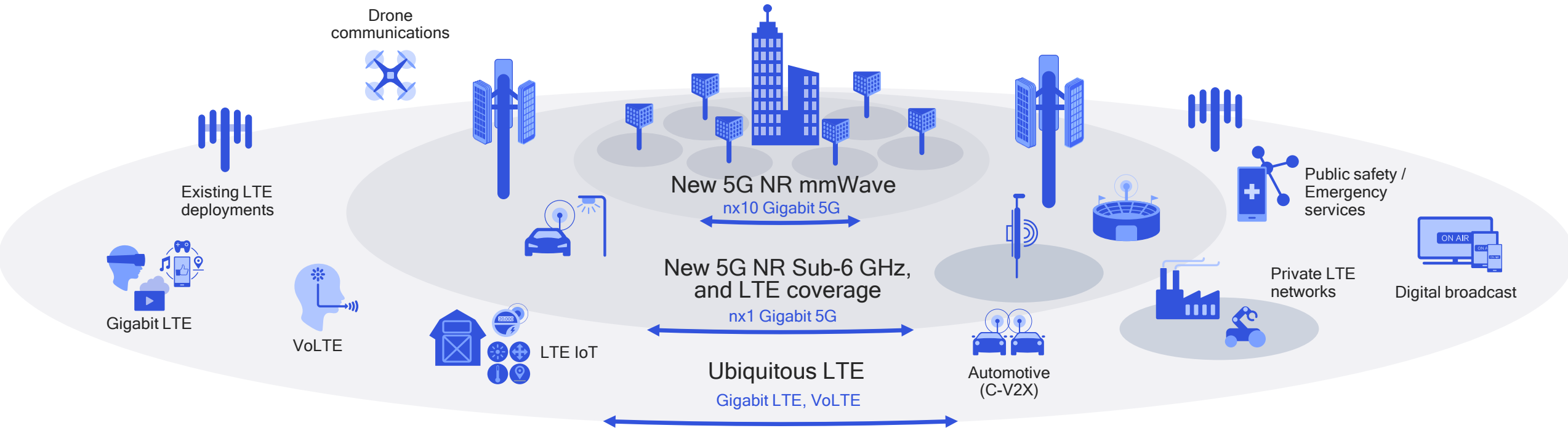
Powering the digital economy

>\$12 Trillion

In goods and services by 2035*

LTE Advanced Pro accelerates the 5G mobile expansion

Providing ubiquitous coverage and essential services that complement 5G NR



Gigabit LTE is here now
and delivers a seamless
5G mobile experience

LTE IoT, private LTE network,
C-V2X are enabling new
mobile use cases today

LTE Advanced Pro leadership
is essential to success
in the 5G Era

Providing essential services to 5G from Day 1

Also digital TV, public safety, drone communication, and more...

LTE Advanced Pro

Gigabit LTE with LAA



Enables ubiquitous Gigabit-class mobile experiences globally; LAA co-siting benefits 5G NR mmWave coverage

Voice (VoLTE)



Delivers essential voice services for a wide variety of 5G use cases leveraging ubiquitous LTE networks

LTE IoT (eMTC + NB-IoT)



Starts to connect the massive IoT today; deployable in-band with 5G NR to enable new 5G NR IoT deployments

Cellular V2X (C-V2X)



Establishes the foundation for safety use cases; continued 5G NR C-V2X evolution for future autonomous cars

Private LTE Network

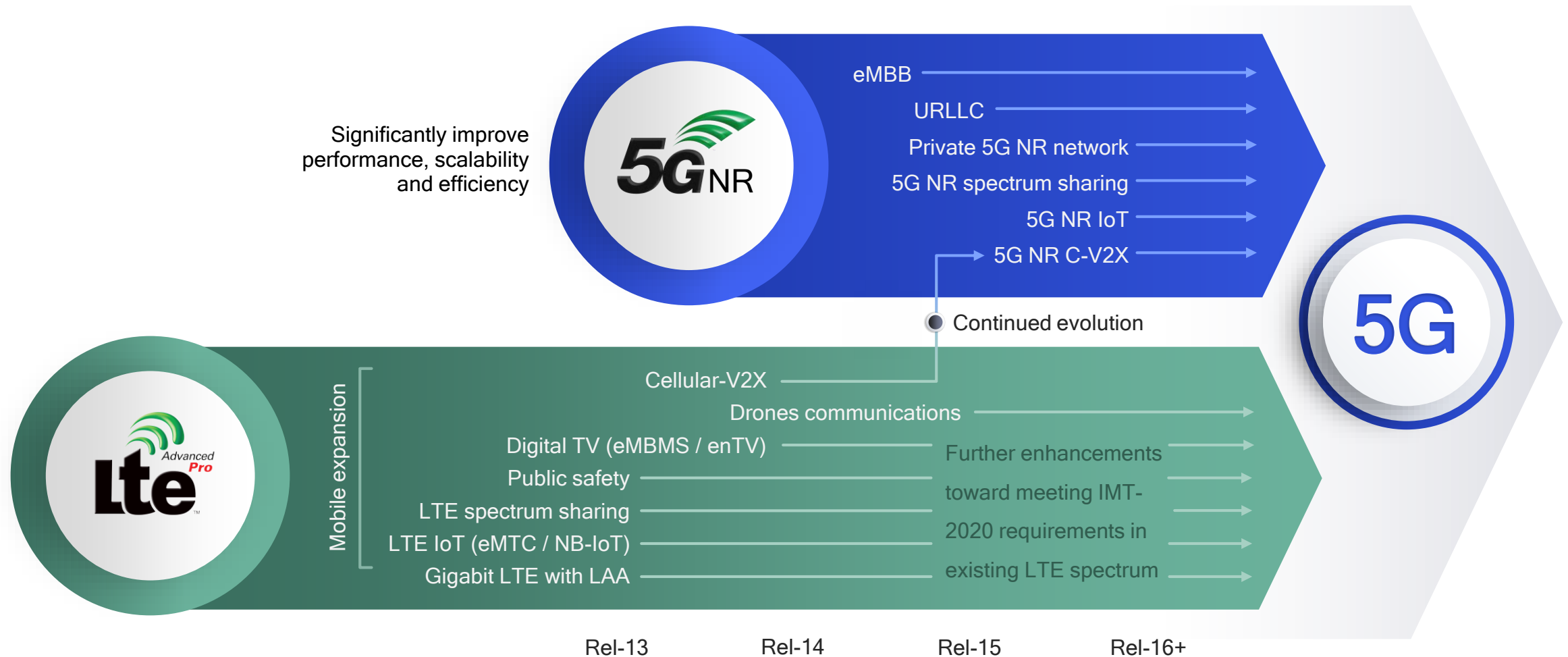


Deploys optimized, dedicated, on-premise network for industrial IoT use cases; paving the path to private 5G NR networks

1. ITU Recommendation ITU-R M.2083-0, September 2015

LTE-A Pro will be submitted with 5G NR to meet IMT-2020¹ requirements

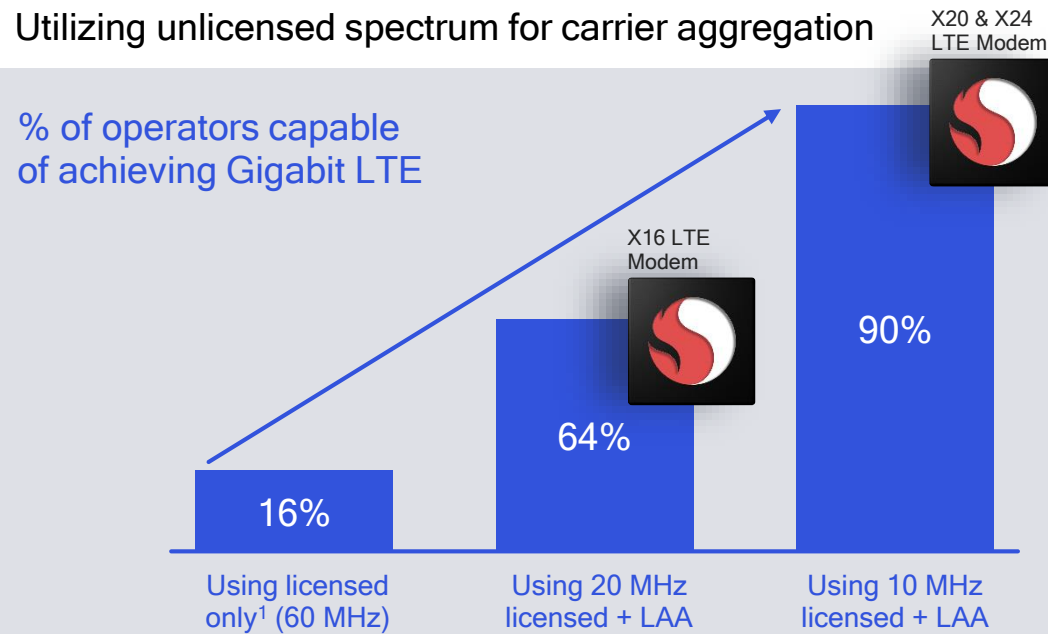
A rich and continued roadmap of LTE Advanced Pro advancements is foundational to the 5G evolution



Gigabit LTE delivers 2 Gbps now and is essential to 5G

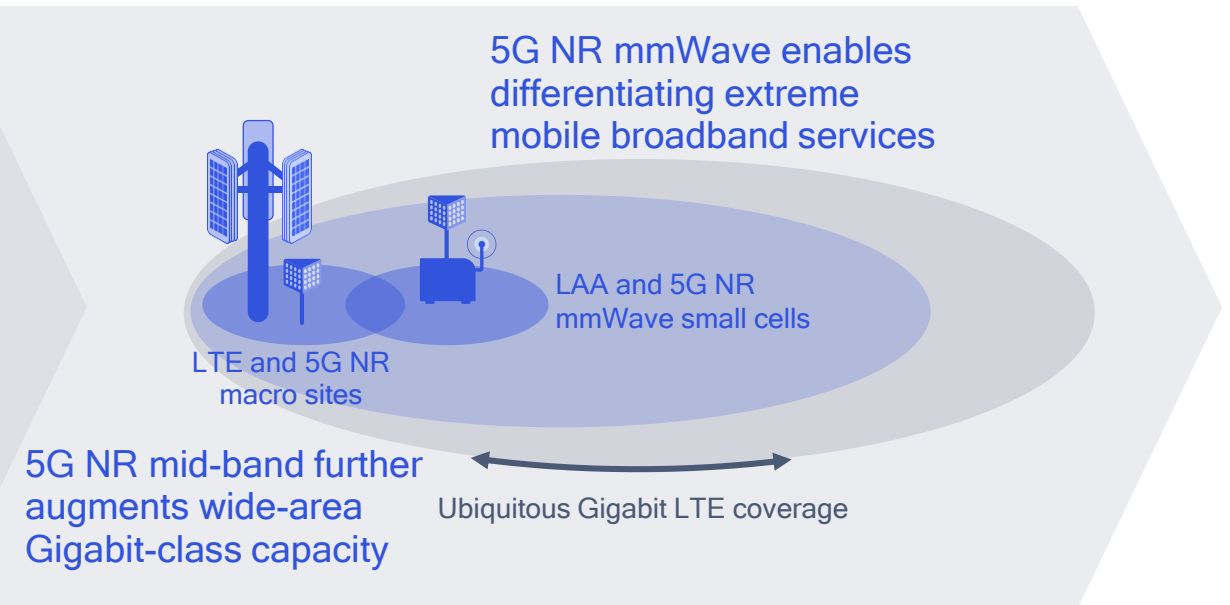
LAA enables global deployments

Utilizing unlicensed spectrum for carrier aggregation



LTE infrastructure benefits 5G NR deployment

Co-siting with LAA small cells to achieve significant mmWave coverage²



Qualcomm Snapdragon is a product of Qualcomm Technologies, Inc. and/or its subsidiaries 1. Based on the use of 4x4 MIMO and 256-QAM; 2. Based on mmWave coverage study, more details at <https://www.qualcomm.com/documents/white-paper-5g-nr-millimeter-wave-network-coverage-simulation>



Over 20 commercial devices, including smartphones, always connected PCs, and more...

Learn more at: <https://www.qualcomm.com/gigabit-lte>



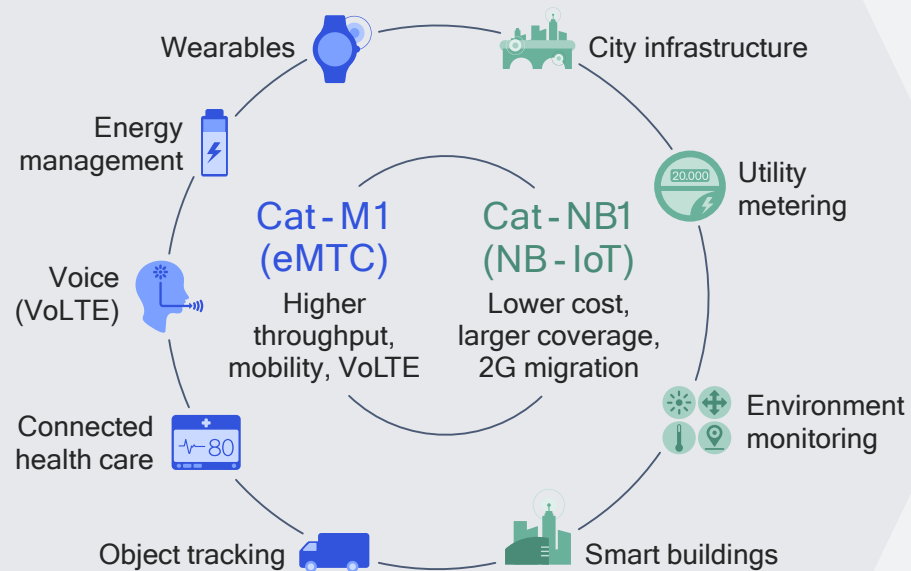
45

Operators in 26 countries with Gigabit LTE planned or trialed

LTE IoT will be the massive IoT solution in the 5G Era

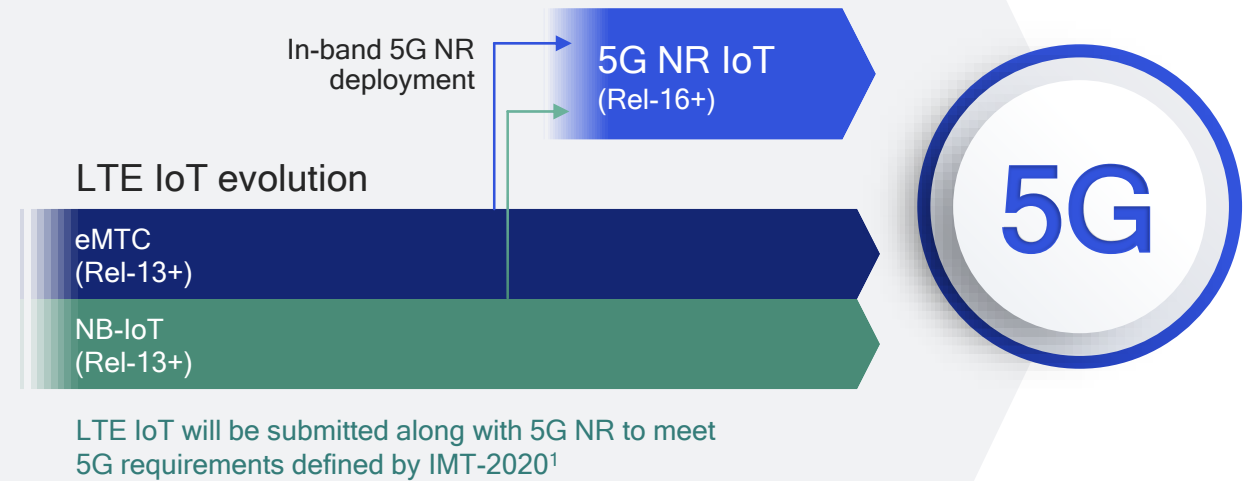
Starting to connect the massive IoT today

With global commercial Cat-M1/NB1 network deployments



5G NR IoT fully leverages LTE IoT

Deploying eMTC and NB-IoT in-band with 5G NR



MDM9206 is a product of Qualcomm Technologies, Inc and/or its subsidiaries

Qualcomm
MDM9206

Flexible LTE IoT chipset platform for
Cat-M1 / Cat-NB1 / E-GPRS

Learn more at: <https://www.qualcomm.com/lte-iot>

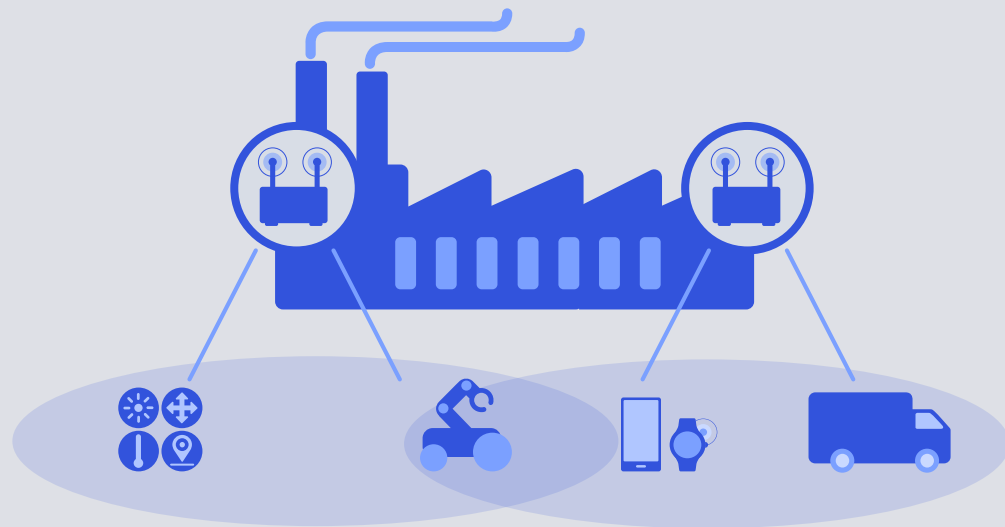
- Global dual-mode solution – single SKU
- Pre-certified modules commercially available today
- Multiple design wins across industry-leading OEMs

1. Defined in ITU Recommendation ITU-R M.2083-0, September, 2015

Private LTE network addresses industrial IoT needs today

Optimizing LTE for the industrial IoT

Scalable from Gigabit LTE to LTE IoT



Paving the path to private 5G NR networks

Advanced capabilities in 3GPP Release 15 Study Items¹



Ultra-reliable
low-latency



Time-sensitive
networking



mmWave for
extreme eMBB



Wireless industrial
ethernet

1. TR 22.821 Feasibility Study on LAN Support in 5G and TR 22.804 Study on Communication for Automation in Vertical Domain

Optimized

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

Dedicated

Easy to deploy small-cells, hosted
or self-contained core network

On-premise

Locally managed,
sensitive data stays local

Learn more at: <https://www.qualcomm.com/private-lte>

V2V

Vehicle-to-vehicle
e.g., collision avoidance safety systems



V2I

Vehicle-to-infrastructure
e.g., traffic signal timing/priority



V2P

Vehicle-to-pedestrian
e.g., safety alerts to pedestrians, bicyclists



V2N

Vehicle-to-network
e.g., real-time traffic/routing, cloud services



Enhanced range and reliability for direct communication without network assistance

C-V2X

Establishes the foundation for safety use cases and a continued 5G NR C-V2X evolution for future autonomous vehicles



C-V2X Release 14 completed in 2017



Broad industry support – 5GAA



Global trials started in 2017

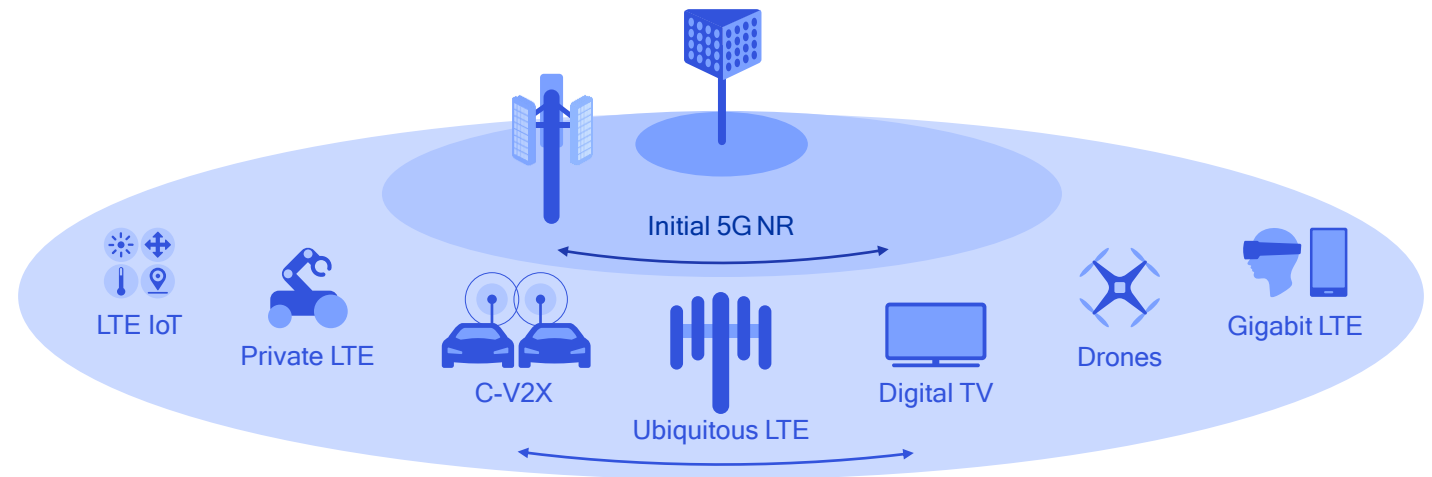


Our 1st announced C-V2X product in September, 2017

Learn more at: <https://www.qualcomm.com/c-v2x>

LTE Advanced Pro accelerates the 5G mobile expansion

Providing ubiquitous coverage and essential services that complement 5G NR



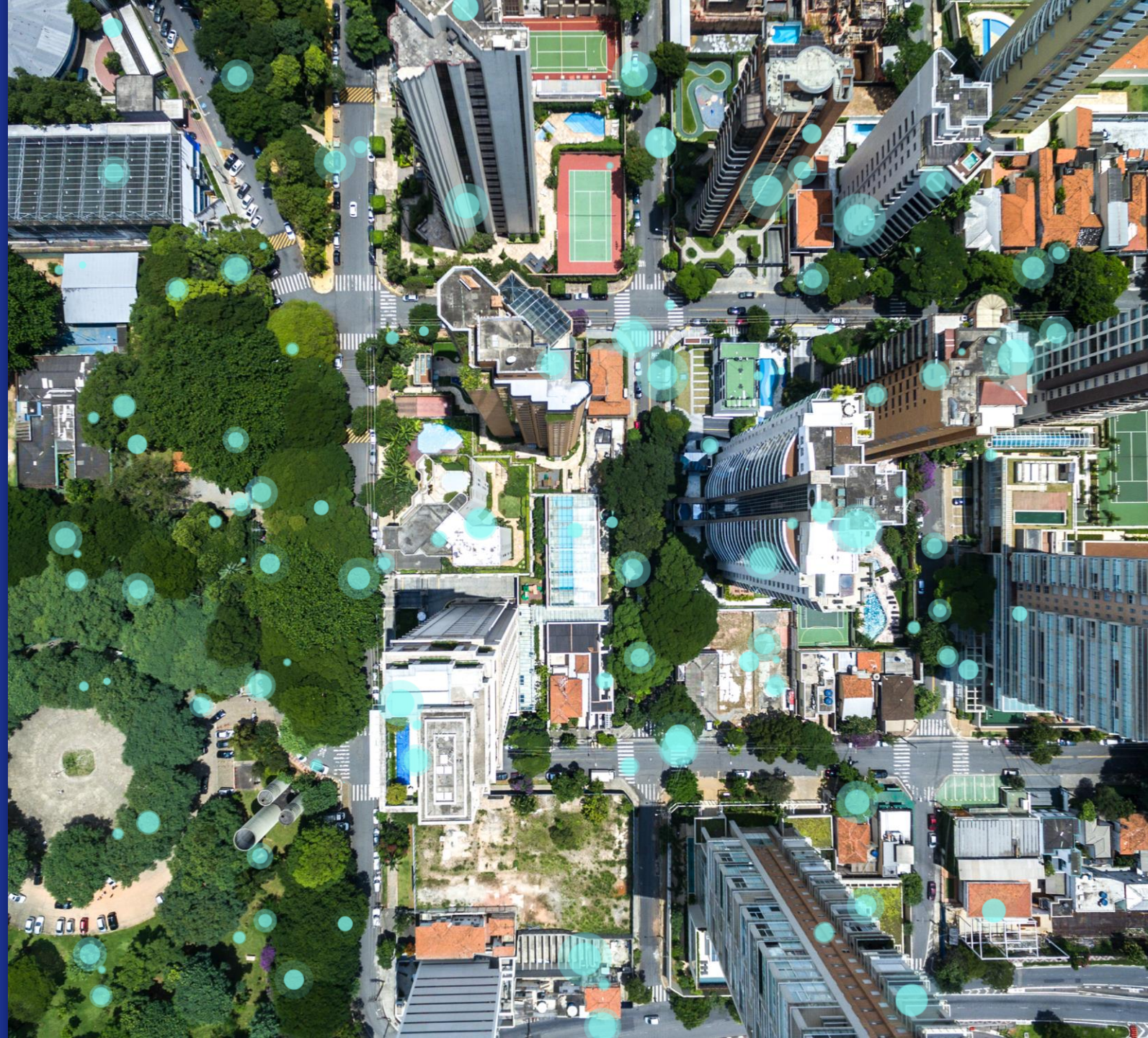
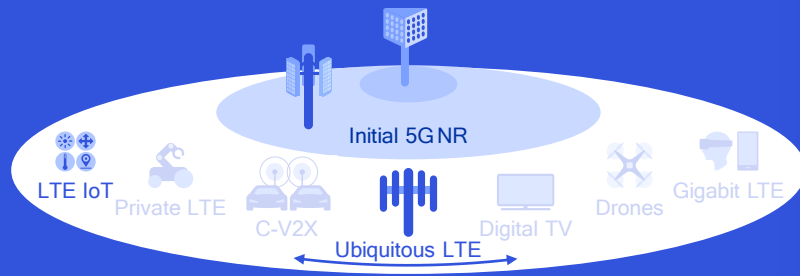
LTE IoT starts to connect the massive IoT and will be the 5G NR IoT solution

Low complexity and power

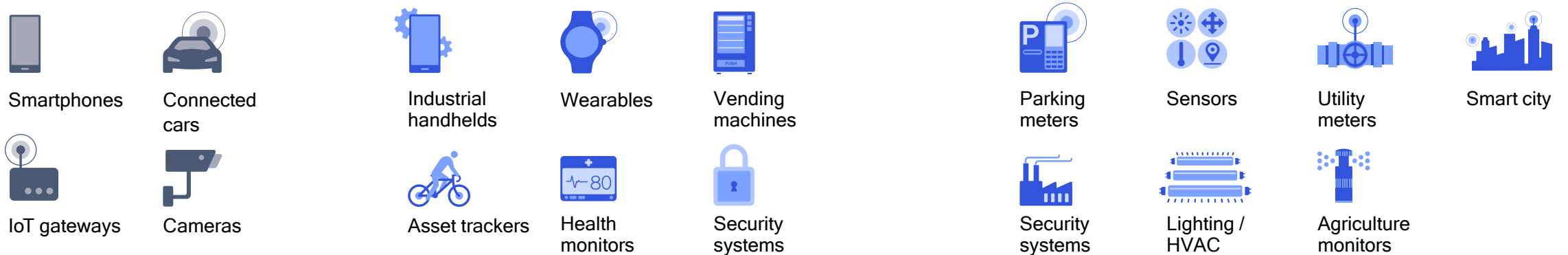
Long range

Large scale

In-band 5G NR deployment



LTE today provides a scalable IoT connectivity platform



LTE IoT: complementary narrowband technologies scaling down in complexity/power

LTE Cat-1 and above

For high-performance IoT and eMBB
– scalable to Gigabit LTE

eMTC Cat-M1¹

For the broadest range of low-complexity IoT use cases

NB-IoT Cat-NB1¹

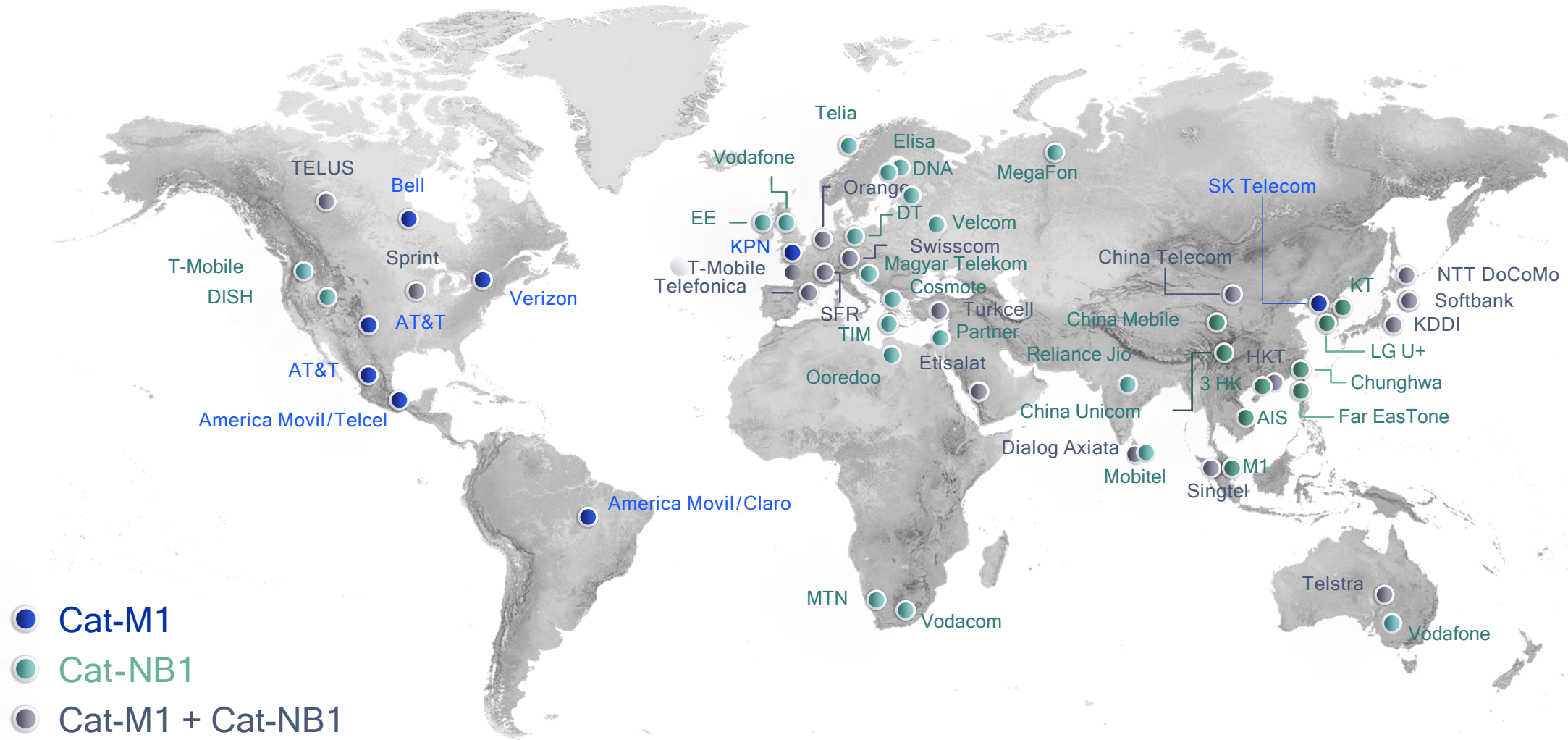
For delay-tolerant, ultra-low complexity IoT use cases

Peak data rate	Up to 1 Mbps ²	<100 kbps
Bandwidth	1.4 MHz	200 kHz
Rx antenna	Single Rx	Single Rx
Duplex mode	Full or half duplex FDD/TDD	Half duplex FDD
Mobility	Limited-to-full mobility	Cell reselection only
Voice	VoLTE	No voice support
Transmit power	23, 20 dBm ³	23, 20 dBm ³
Deployment	In-band	Standalone, in-band, guard band

1. Based on Release-13, Release 14 provides additional enhancements; 2. Full duplex mode, ~300 kbps in half-duplex mode; 3. Integrated PA possible

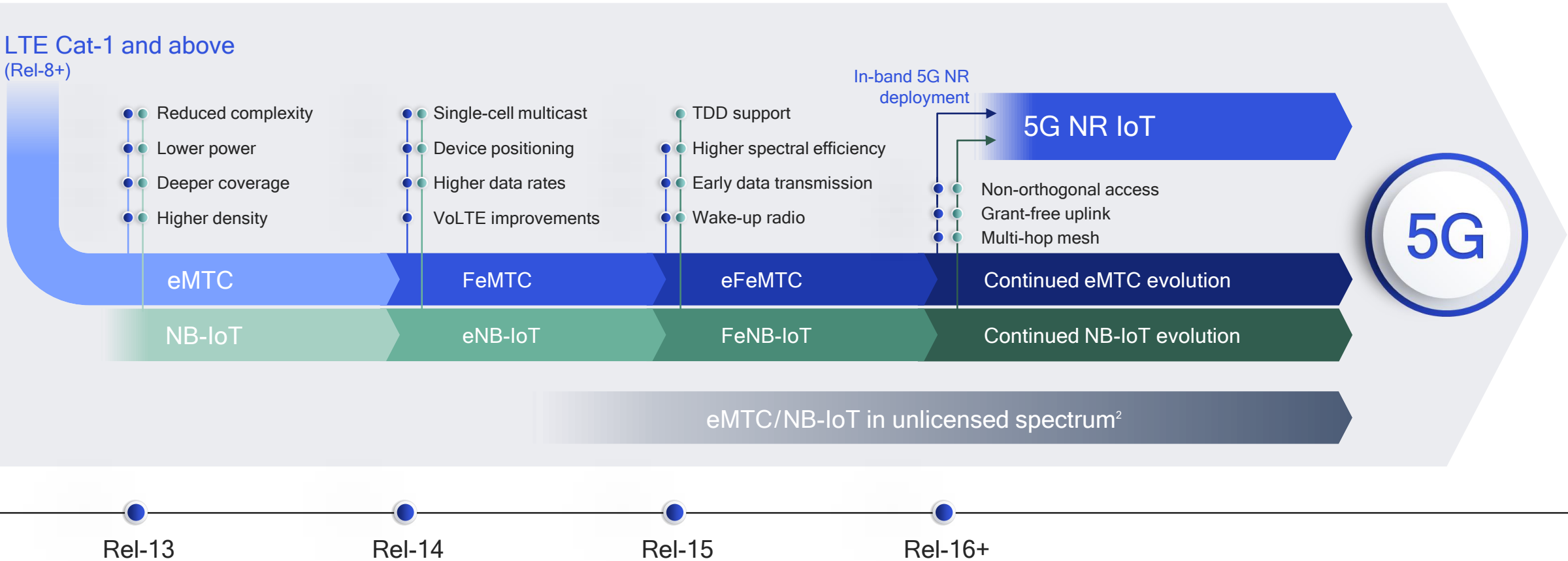
Strong global momentum for LTE IoT—May 2018 status

50+ commercial Cat-M1 and/or Cat-NB1 networks in over 30 countries



Continued evolution to meet tomorrow's massive IoT needs

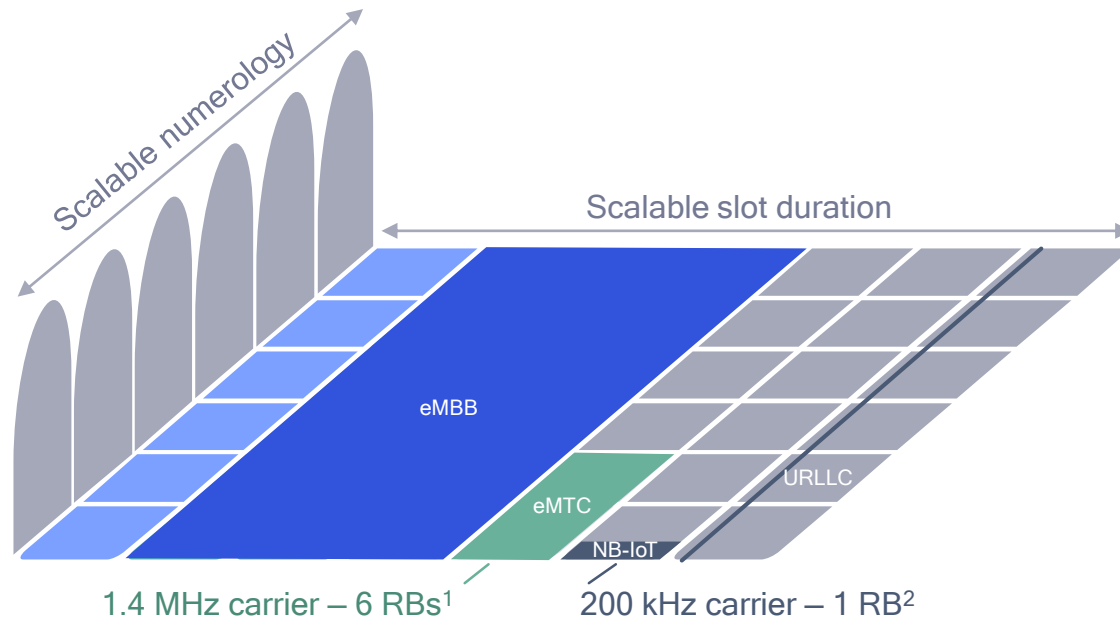
Essential to 5G – LTE IoT to be submitted to meet IMT-2020¹ requirements



1. Defined in ITU Recommendation ITU-R M.2083-0, September, 2015; 2. Standardization in MulteFire Alliance

5G NR IoT to fully leverage the LTE IoT evolution

Enabled by in-band deployment of LTE IoT in 5G NR spectrum



In-band eMTC / NB-IoT support in Rel-16

5G NR 2ⁿ scaling of 15 kHz subcarrier spacing is natively compatible with eMTC and NB-IoT numerologies

Agnostic to core networks

Both 5G NR deployment options – NSA with LTE EPC and SA with 5G core – support eMTC and NB-IoT evolution

Advanced features coming in Rel-16+

Non-orthogonal access, grant-free uplink, and multi-hop mesh will deliver even better performance and efficiency

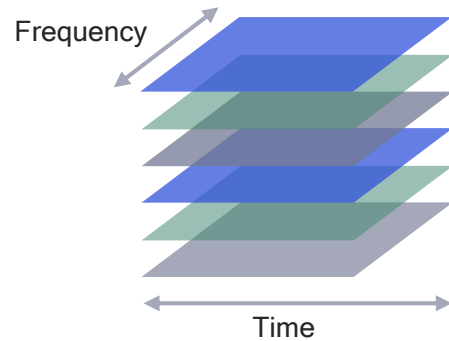
1. Cat-M1 uses 6 Resource Blocks (RBs) with 12 tones per RB at 15 kHz SCS; 2. Cat-NB1 uses 1 Resource Block (RB) with 12 tones with 12 tones per RB at 15 kHz SCS, single-tone option also available

5G NR

Flexible framework designed to support future evolution addressing even broader IoT use cases such as latency sensitive applications

Pioneering tomorrow's massive IoT technologies

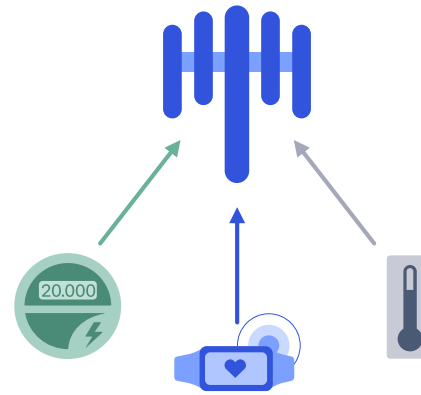
Applies to LTE IoT and 5G NR IoT evolution – potential for 3GPP Rel-16+



Non-orthogonal multiple access

Even higher connection density

- NOMA is part of 5G NR Rel-15 Study Item
- Can be either scheduled or grant-free
- Increases device density and network efficiency

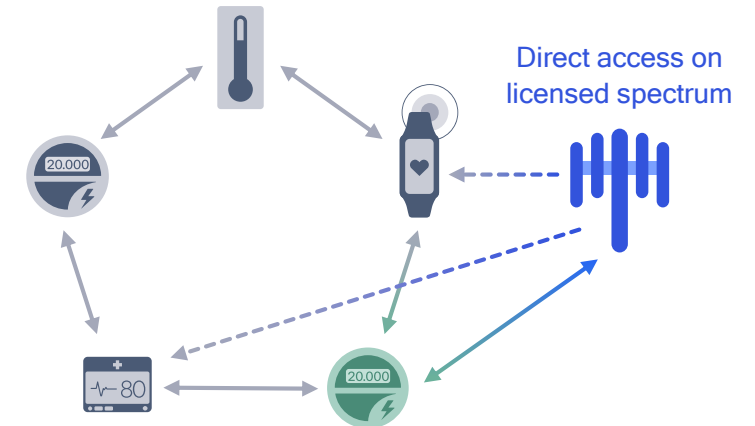


Grant-free uplink

Autonomous mode transmission

- Contention-based access for IoT devices
- For sporadic uplink of small data bursts
- Also key enabler of mission-critical communication

Mesh on unlicensed or partitioned with uplink licensed spectrum¹



Mesh networking

Multi-hop mesh with WAN management

- For low-power devices with challenging placements
- Especially uplink data relayed via nearby devices
- Expands on LTE Device-to-Device (D2D)

1. Greater range and efficiency when using licensed spectrum, e.g. protected reference signals. Network time synchronization improves peer-to-peer efficiency

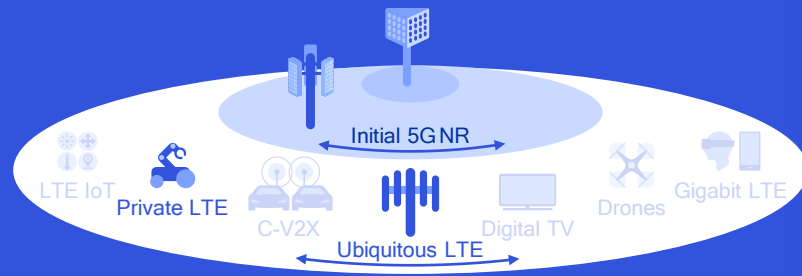
Private LTE network enables optimized industrial IoT use cases

Dedicated local network

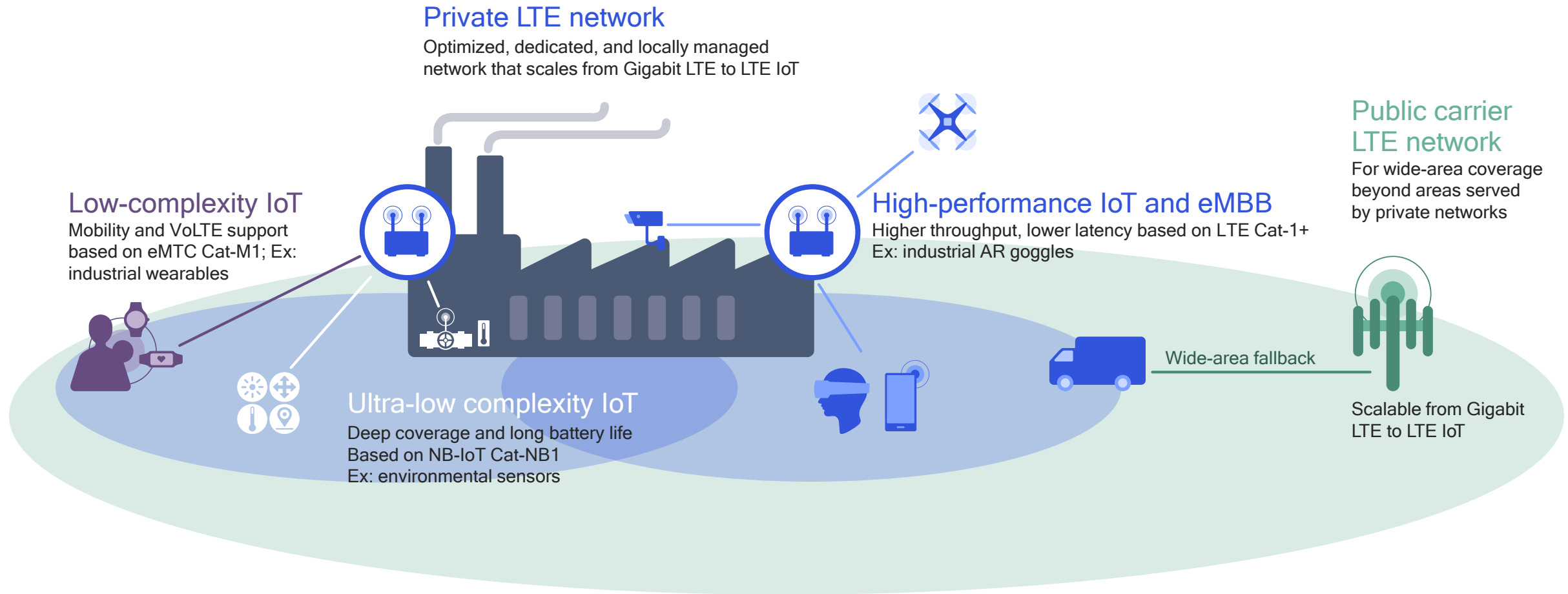
Customized services

Ready for deployment

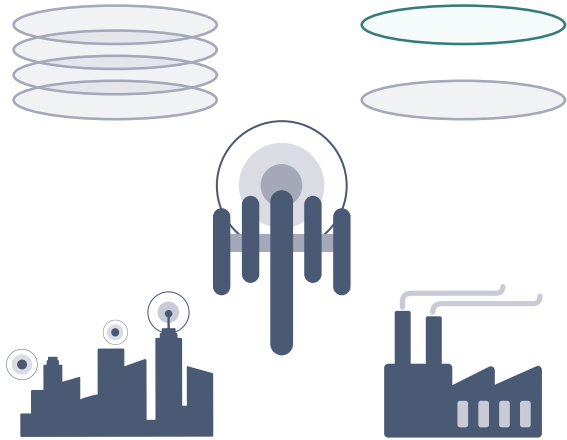
Path to private 5G NR network



Providing a scalable platform for diverse IIoT use cases



Private LTE Networks—an opportunity for mobile operators

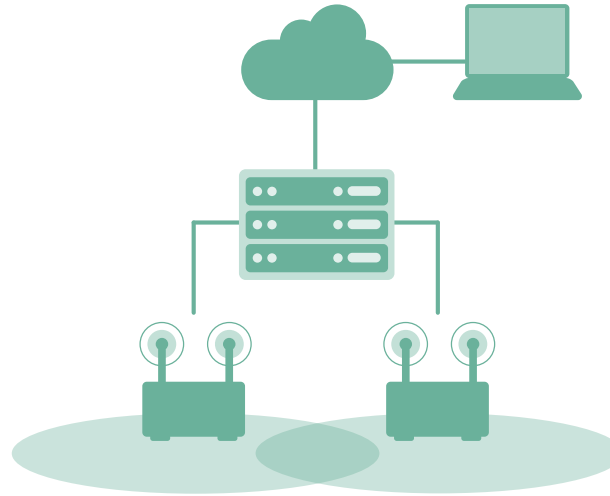


Licensed spectrum assets

Dedicate a portion for private LTE networks

Provides predictable performance

Spectrum often under-utilized in industrial areas

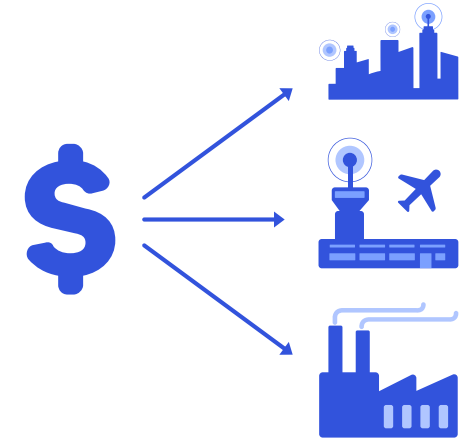


Expertise in mobile networks

Expertise in deploying and operating mobile networks

Existing relationships with vendors

Leverage existing mobile network assets



Existing sales channels

Already provide services to many industrial customers

Extend with private LTE network

Multiple options, including selling private LTE network as a service

Private 5G NR network enables the next Industrial Revolution

New capabilities

- URLLC – ultra-reliable, low-latency
- Time sensitive networking

Large cellular ecosystem

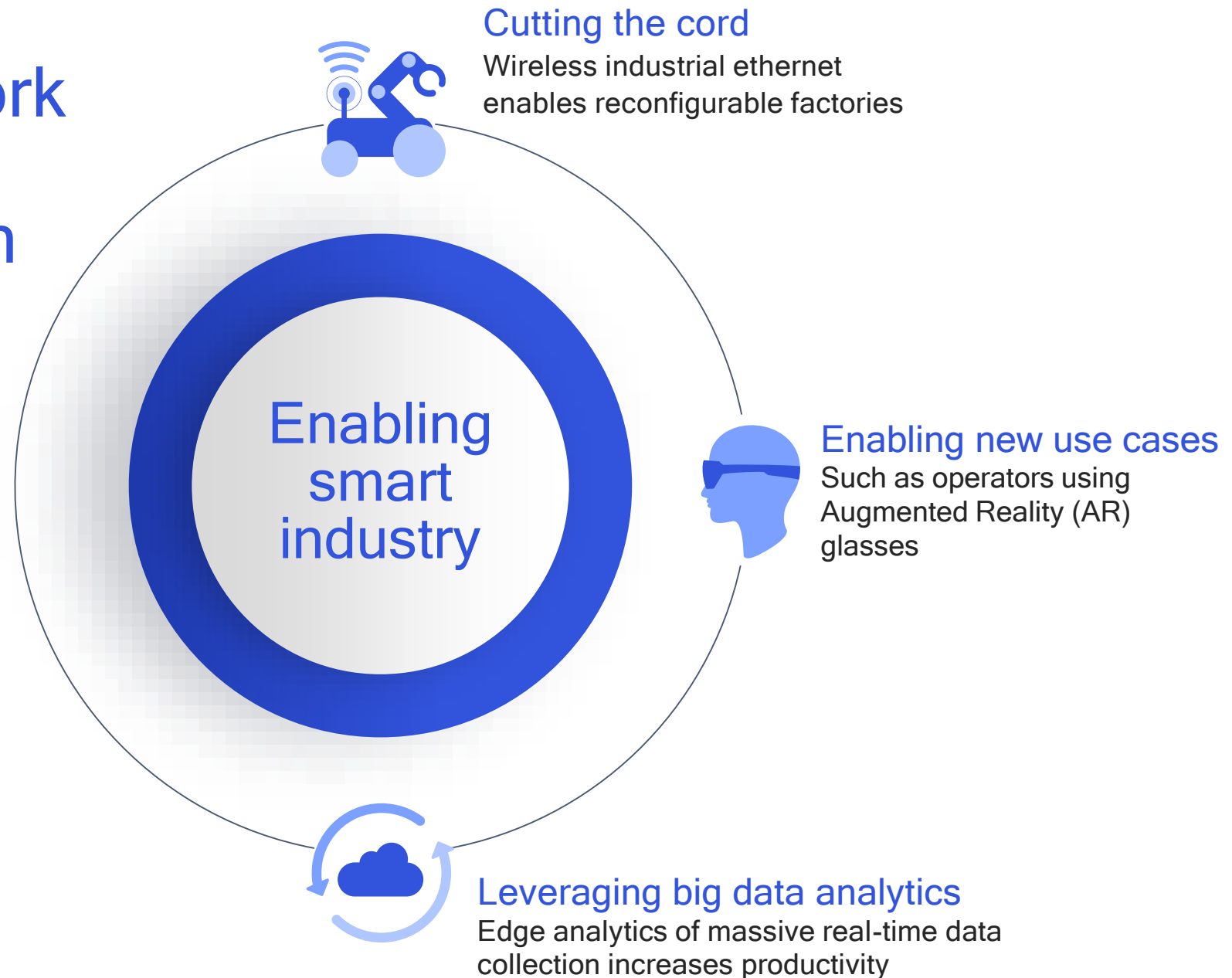
- Global solutions
- Certified interoperability

More spectrum

- Licensed, shared, unlicensed
- Low, mid, mmWave spectrum

Single network for the entire factory

- Multimode network supporting LTE & 5G NR
- Scalable to all connectivity needs



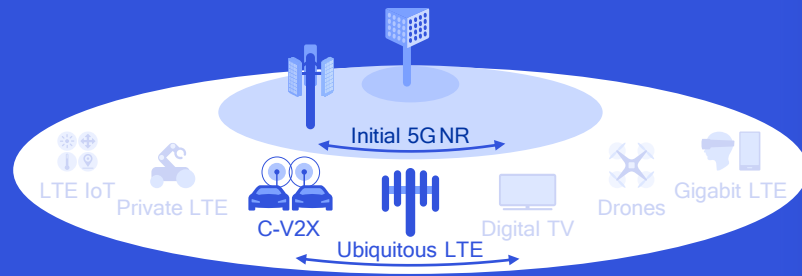
C-V2X establishes the safety foundation for future autonomous vehicles

Enhanced safety

Low-latency and high-reliability

Network-independent

Forward compatible to 5G NR C-V2X



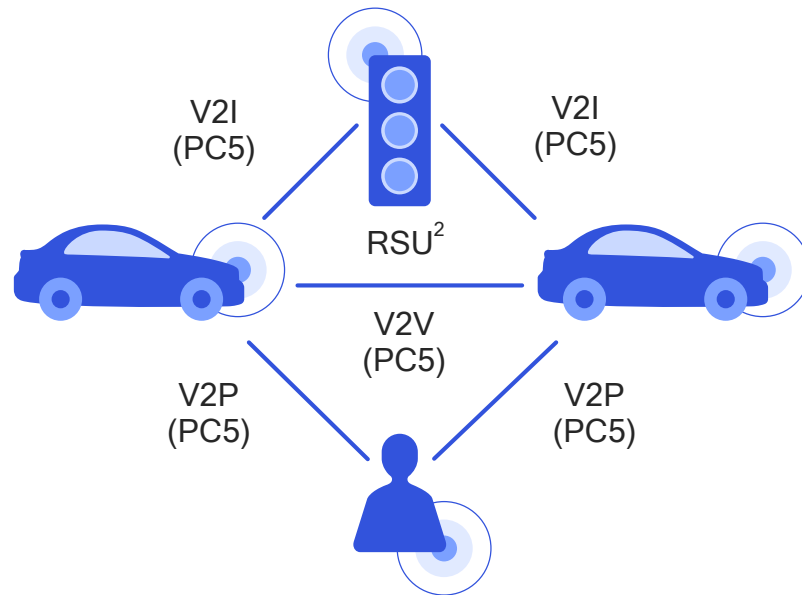
C-V2X enables network independent communication

Direct safety communication independent of cellular network

Low latency Vehicle to Vehicle (V2V), Vehicle to Infrastructure (V2I), and Vehicle to Person (V2P) operating in ITS bands (e.g. 5.9 GHz)

Direct PC5 interface

e.g. location, speed, local hazards

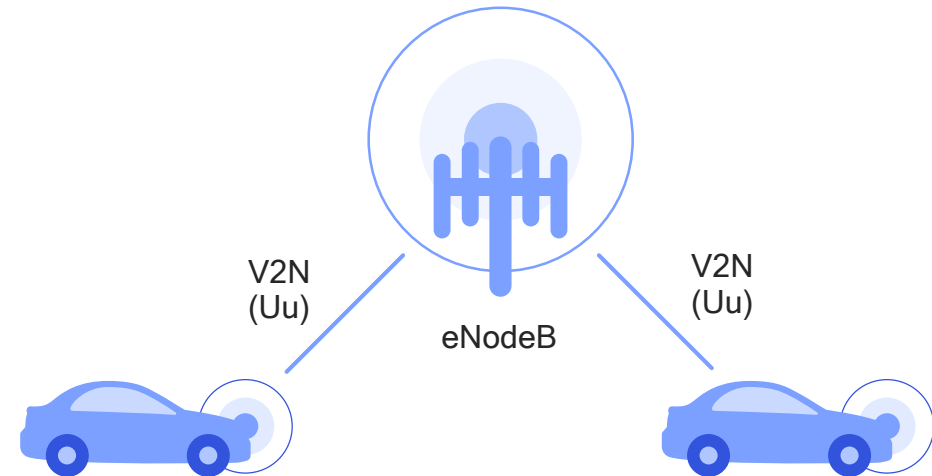


Network communications for complementary services

Vehicle to Network (V2N) operates in a mobile operator's licensed spectrum

Network Uu interface

e.g. accident 2 kilometer ahead



1. PC5 operates on 5.9GHz; whereas, Uu operates on commercial cellular licensed spectrum 2. RSU stands for roadside unit. 1. 3GPP also defines a mode, where eNodeB helps coordinate C-V2X Direct Communication; 2. GNSS is required for V2X technologies, including 802.11p, for positioning. Timing is calculated as part of the position calculations and it requires smaller number of satellites than those needed for positioning

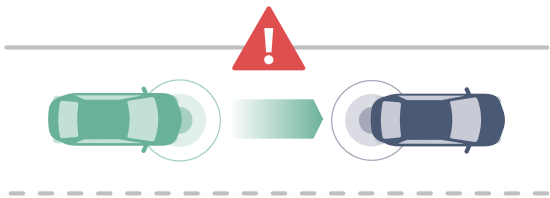
C-V2X has a strong evolution path towards 5G NR

While maintaining backward capabilities

Evolution to 5G NR, while being backward compatible
C-V2X Rel-14 is necessary and operates with Rel-16

Basic and enhanced safety
C-V2X Rel-14/Rel-15 with enhanced range and reliability

Basic safety
IEEE 802.11p

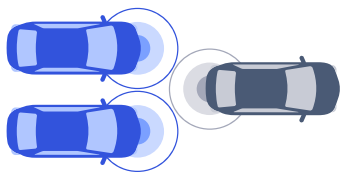


Autonomous driving use cases
5G NR C-V2X Rel-16

Backward compatible with Rel-14/Rel-15 enabled vehicles

Higher throughput
Higher reliability

Wideband ranging/positioning
Lower latency



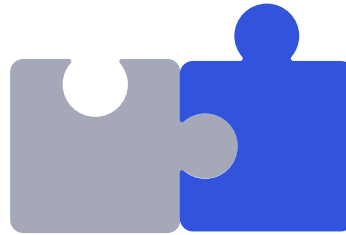
5G NR C-V2X complements Rel-14 with new capabilities

Targeting new use cases for autonomous driving

Rel-14 C-V2X

Automotive safety

Do not pass
warning (DNPW)
Intersection movement
assist (IMA) at a blind
intersection
Blind curve /
Local hazard warning



Rel-16 5G NR C-V2X

Autonomous driving

Local high definition
maps / “Bird’s eye view”
Intention /
Trajectory sharing
High throughput
sensor sharing
Wideband ranging
and positioning



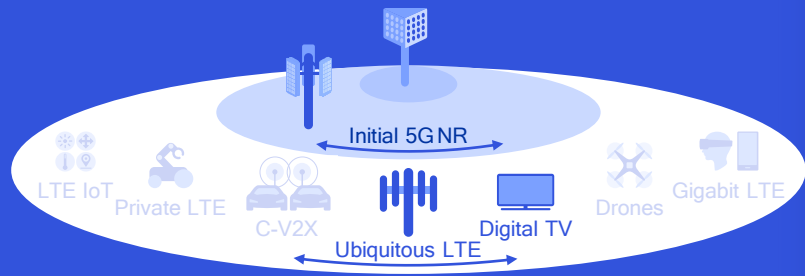
LTE eMBMS/enTV is the 5G Broadcast solution

High spectrum efficiency

Scalable capacity

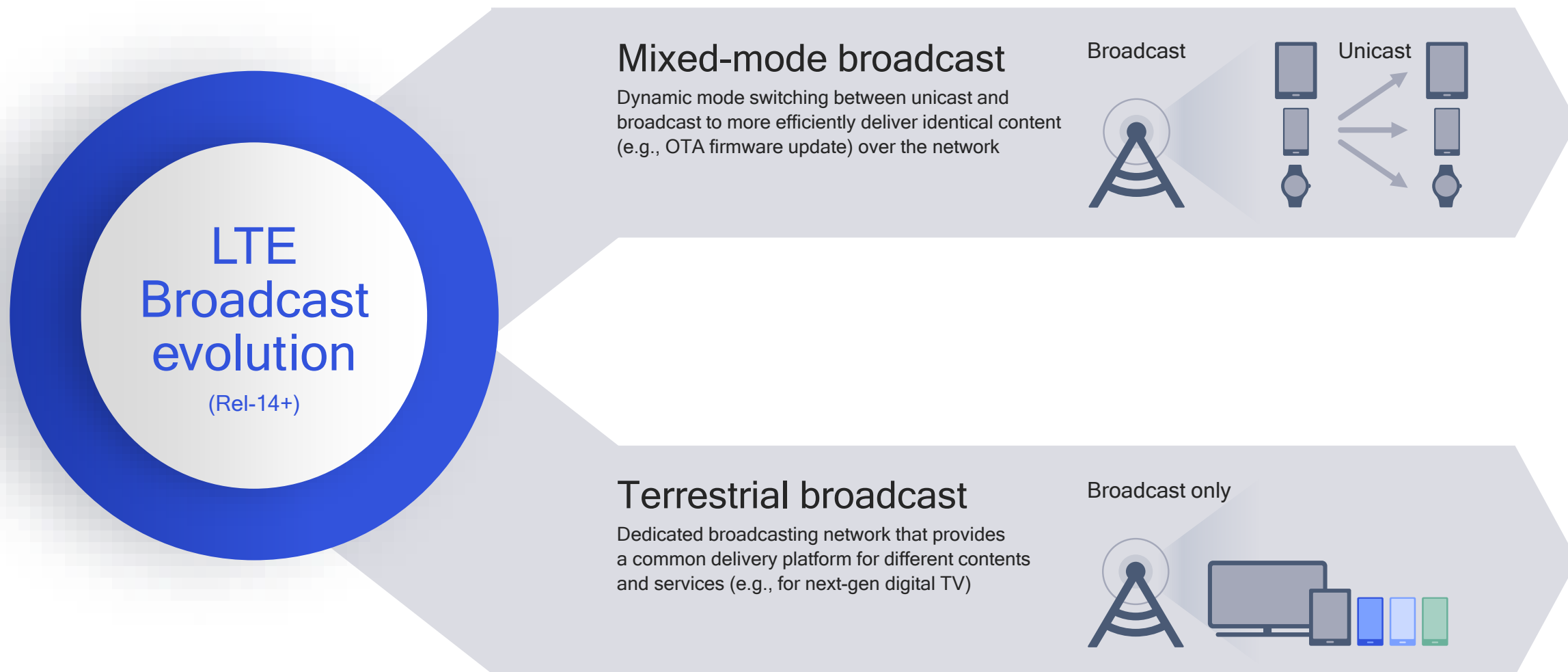
For next-gen digital TV delivery

Meets 5G broadcast requirements



LTE broadcast addresses a wide range of services

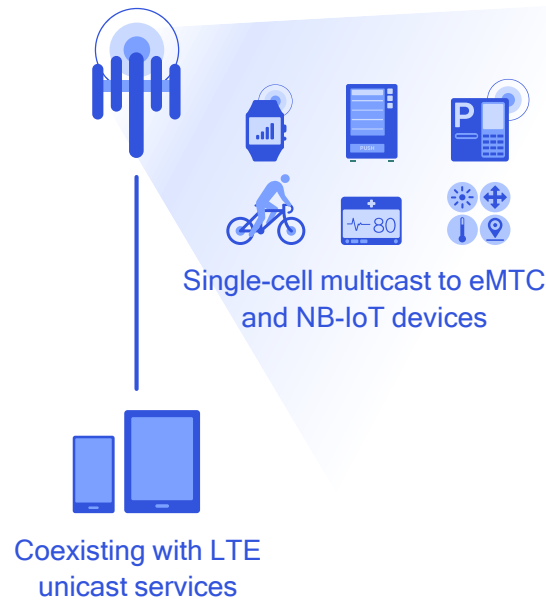
Two paths—mixed and standalone broadcasting



Mixed-mode broadcast is essential to new mobile services

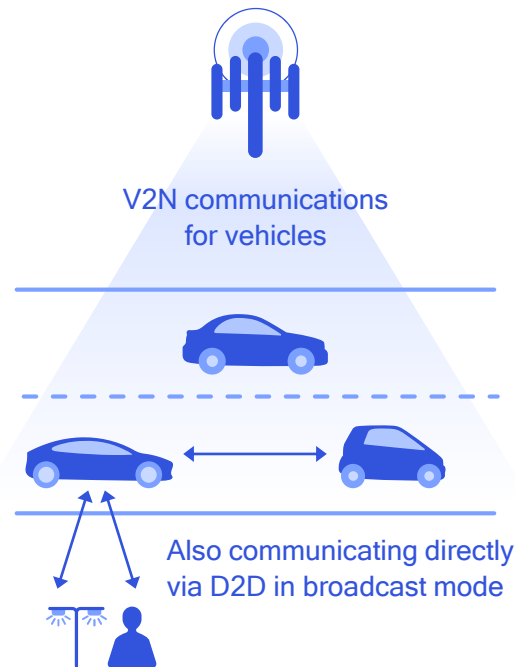
Enabling new capabilities and efficiencies for a wide variety of use cases

LTE IoT 3GPP Rel-14+



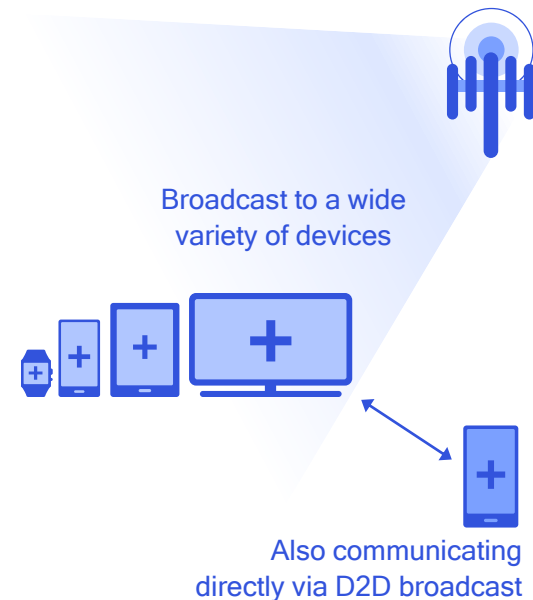
Enhancing SC-PTM¹ to enable efficient firmware upgrade and group messaging

C-V2X 3GPP Rel-14+



V2N builds upon eMBMS to deliver real-time information (e.g., traffic) to vehicles

Public safety 3GPP Rel-12+



Leveraging eMBMS to efficiently deliver real-time emergency notifications

Venue broadcast 3GPP Rel-9+



Dynamic broadcast can offload mass media traffic in high-density deployments

1. Single cell point to multipoint defined in 3GPP Rel-13

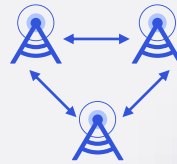
Terrestrial broadcast for next-gen digital TV delivery

enTV¹ – part of 3GPP Rel-14 – meets terrestrial TV broadcast requirements

Radio access enhancements

Longer range

New 1-symbol numerology with longer 200us CP² to support 15 km ISD³



More broadcast capacity

Supports dedicated broadcast network with 100% eMBMS carrier allocation



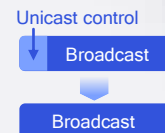
More deployment flexibility

Single network for mobile and fixed devices with enhanced support for rooftop reception



Better efficiency

New subframe design reduces overhead in dedicated broadcast transmissions



System layer enhancements

Receive only mode

Delivery of free-to-air content to devices without SIM/service subscription



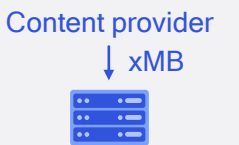
Transport only service

TV broadcasters can deliver content in native format without transcoding



Standardized interface

Content providers can deliver media over LTE with a unified framework



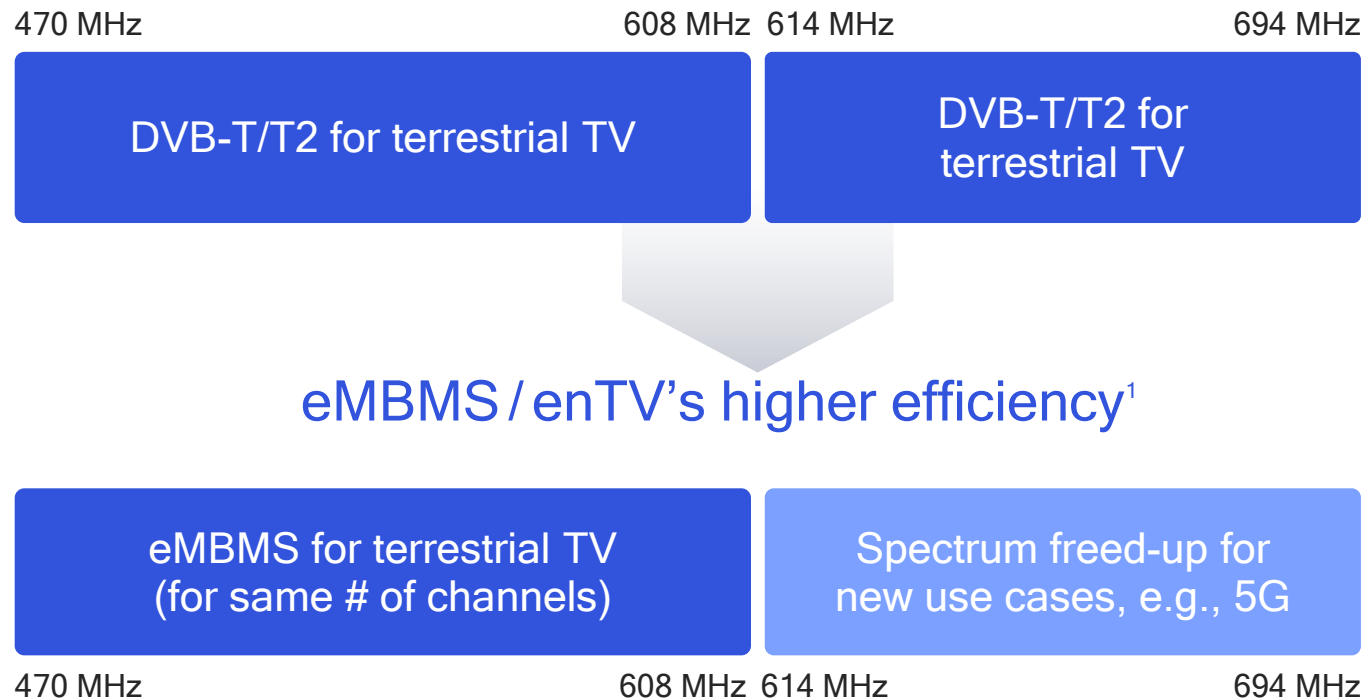
Shared broadcast

Multiple operators can serve users on a common broadcast carrier



enTV—a strong candidate for next-gen digital TV in Europe

Targeting deployments
in re-farmed 700 MHz



Meeting all EU digital TV
broadcast requirements

Regulation compliant

Allows frequency reuse and adheres to ITU-GE-06 to protect existing DTT² services

Wide-area coverage

Provides at least 50% edge coverage³ for fixed TV and 95% area coverage for mobile TV

Diverse services

Supports free-to-air content delivery, paid media⁴ streaming, as well as applications

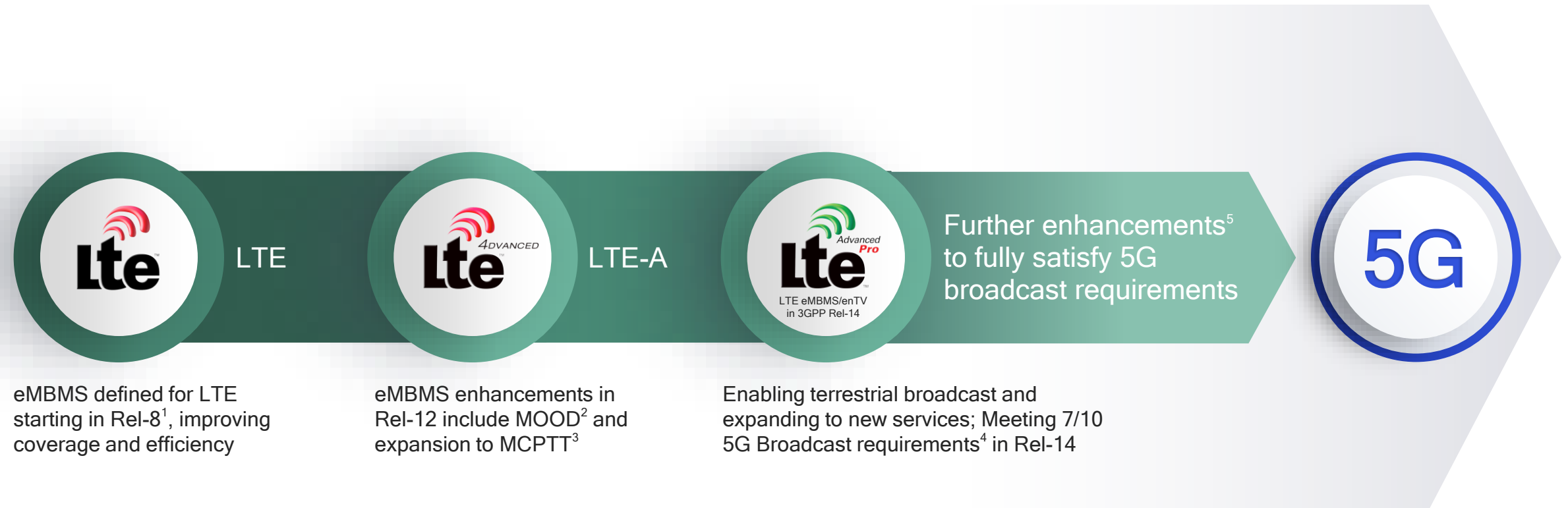
Diverse deployments

Supports fixed (e.g., rooftop) and mobile (e.g., smartphone) receptions in a common spectrum allocation

1. ~2x more efficient than DVB-T/ATSC and provides longer range up to 15km (with further extended CP of 200 us and features such as 2x2 MIMO, 256 QAM, increased subframe limit); Assumptions: current broadcast technology operates in MFN mode with a frequency reuse of at least four with a spectrum efficiency of up to 4 bps/Hz inside each cell. This corresponds to an overall spectrum efficiency of approx. 1bps/Hz. Whereas eMBMS operates in SFN over the entire coverage area with a spectrum efficiency of up to 2bps/Hz; 2. Digital Terrestrial TV; 3. With margin for 1% time co-channel interference; 4. Can be video, audio, text, etc.

LTE eMBMS/enTV is the 5G broadcast solution

Building upon a strong 3GPP technology foundation



1. 3GPP Rel-8 defined physical layer aspects, Rel-9 defined higher layer and network related aspects; 2. Multicast operation on Demand in Rel-12, evolving for per cell basis in Rel-13;

3. Mission-critical Push to Talk is part of Rel-12; 4. 5G broadcast requirements defined in 3GPP TS 38.913; 5. Such as wider area coverage up to 100 km cell radius, more efficient multiplexing with unicast, and utilizing MIMO

Accelerating cellular drone communications technology

Completed OTA testing over commercial LTE networks and 3GPP Study Item in 2017

Optimize LTE for drones in Rel-15

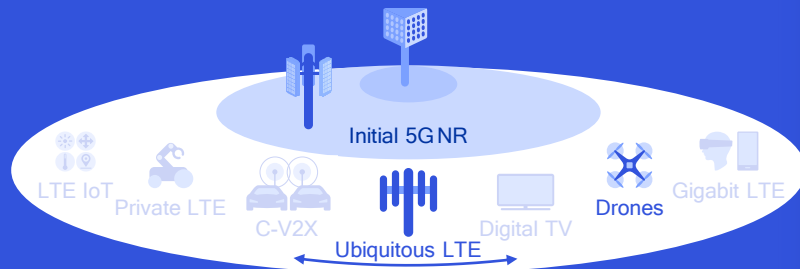
Better mobility and interference management for high-altitude operation

Guide cellular drone regulations development

For command and control, subscription verification, certification, and more

Accelerate 5G development

Specifically for massive deployments of mission-critical drone use cases



Learn more at: <http://www.qualcomm.com/cellular-drones>



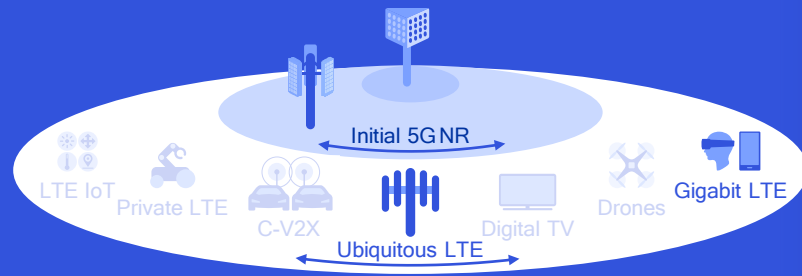
Gigabit LTE is here now and delivers a seamless 5G mobile experience

Global deployments today

Enabling next-gen mobile broadband

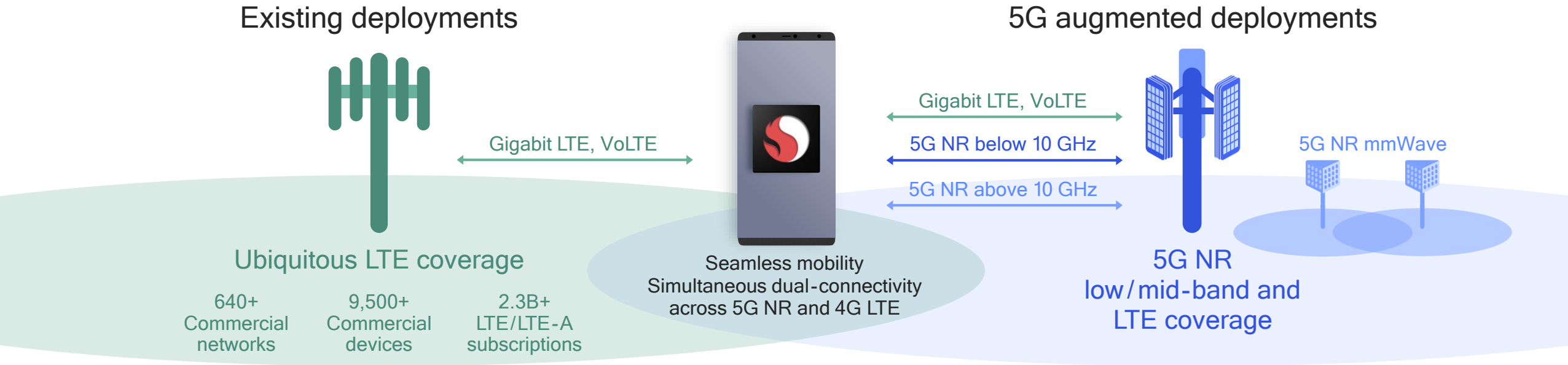
Evolving to 2Gbps

Essential to 5G NR eMBB



Gigabit LTE provides the coverage foundation for 5G

Spectrum aggregation with 5G NR to fully leverage LTE investments



Qualcomm Snapdragon is a product of Qualcomm Technologies, Inc. Source: GSA (www.gsacom.com)—Oct 2017 on network launches, Oct 2017 on subscriptions, Nov 2017 on commercial devices

Enabling gigabit experiences everywhere

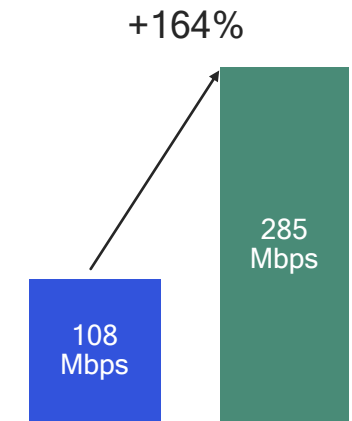
Providing VoLTE leveraging LTE's ubiquitous coverage

Supplementing 5G NR mid-band and mmWave

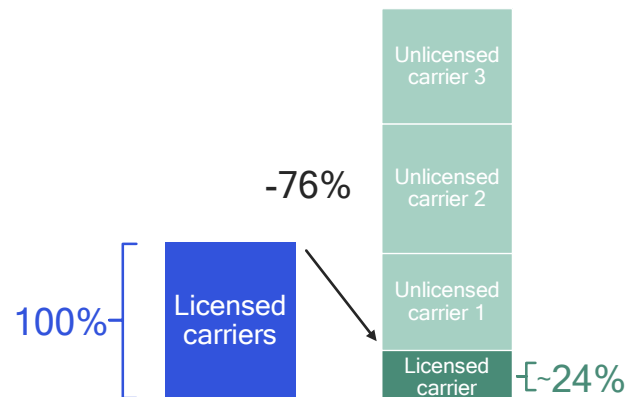
Gigabit LTE enables a more consistent 5G experience

Optimizing existing LTE networks to deliver faster throughput and more capacity

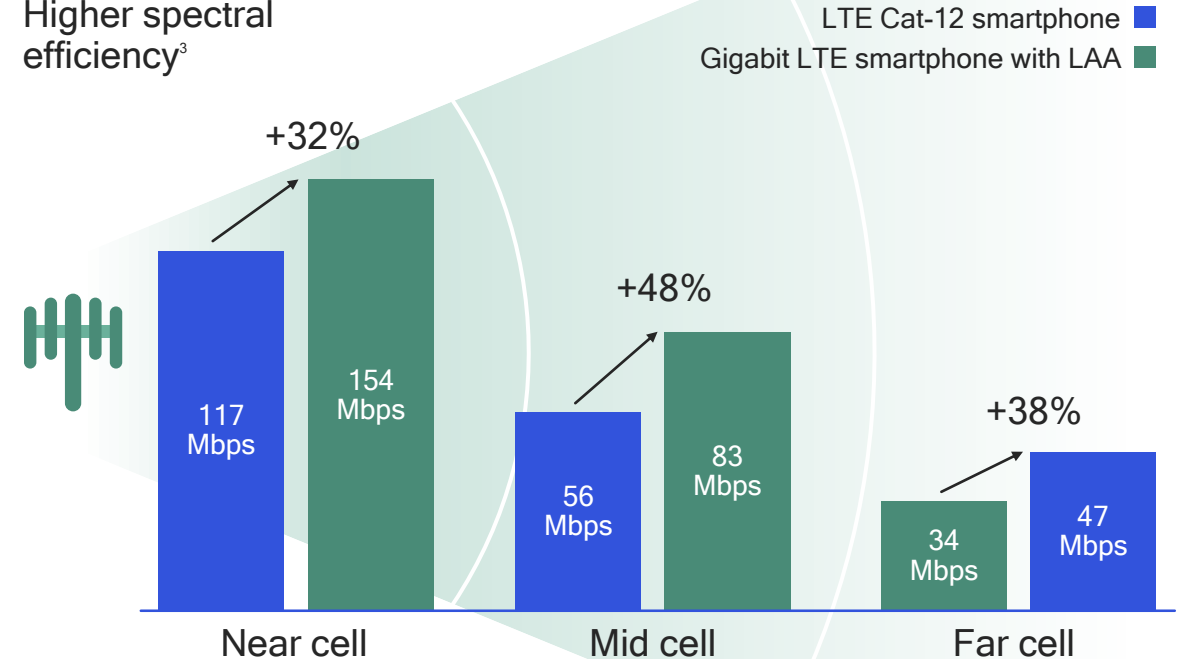
Faster experienced user throughput¹



More capacity with fewer licensed resources²



Higher spectral efficiency³

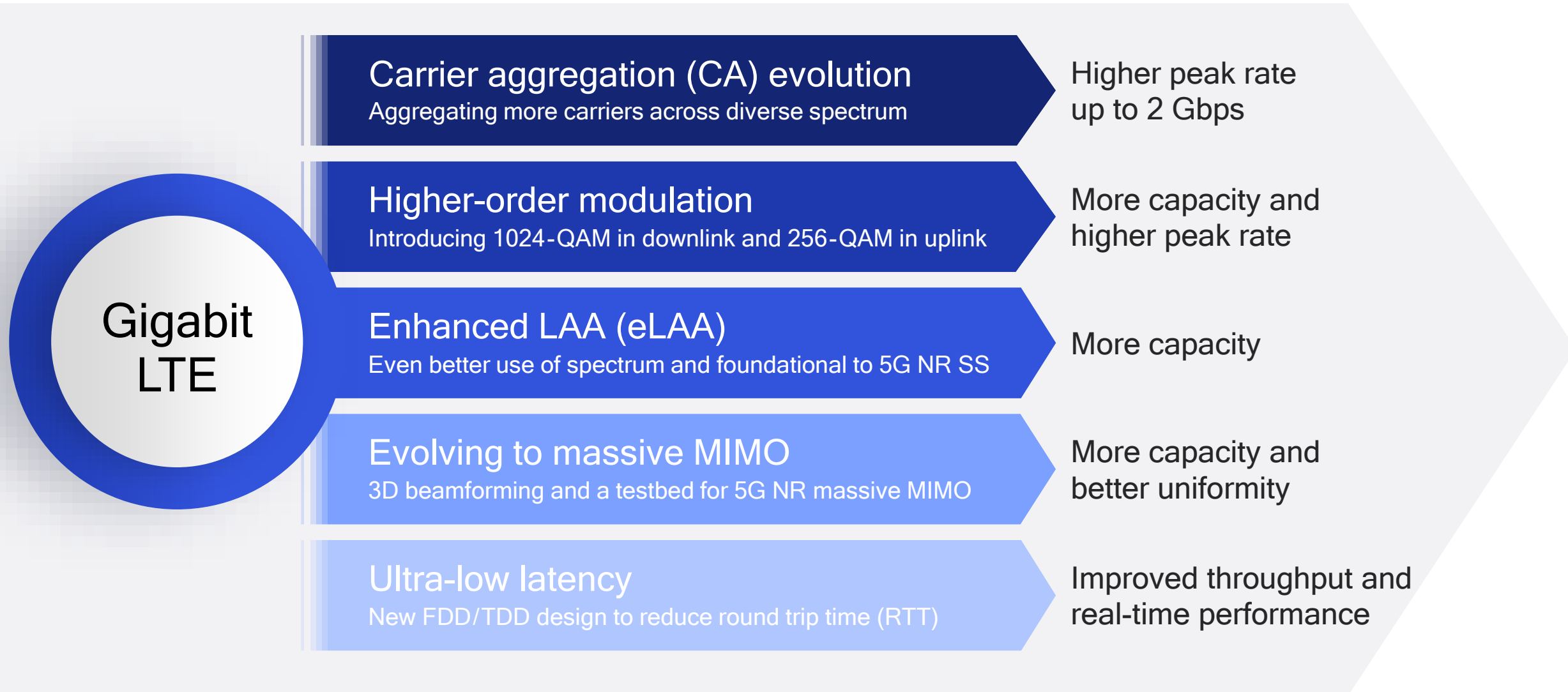


1. Based on Google Play download; 2. Using 20 MHz licensed carrier and 60 MHz unlicensed carriers, 4x4 MIMO, 256-QAM; 3. RB normalized data rates, RSRP assumptions: far cell - > -85dBm; mid cell - < -85 dBm & > -100 dBm; far cell - < -100 dBm

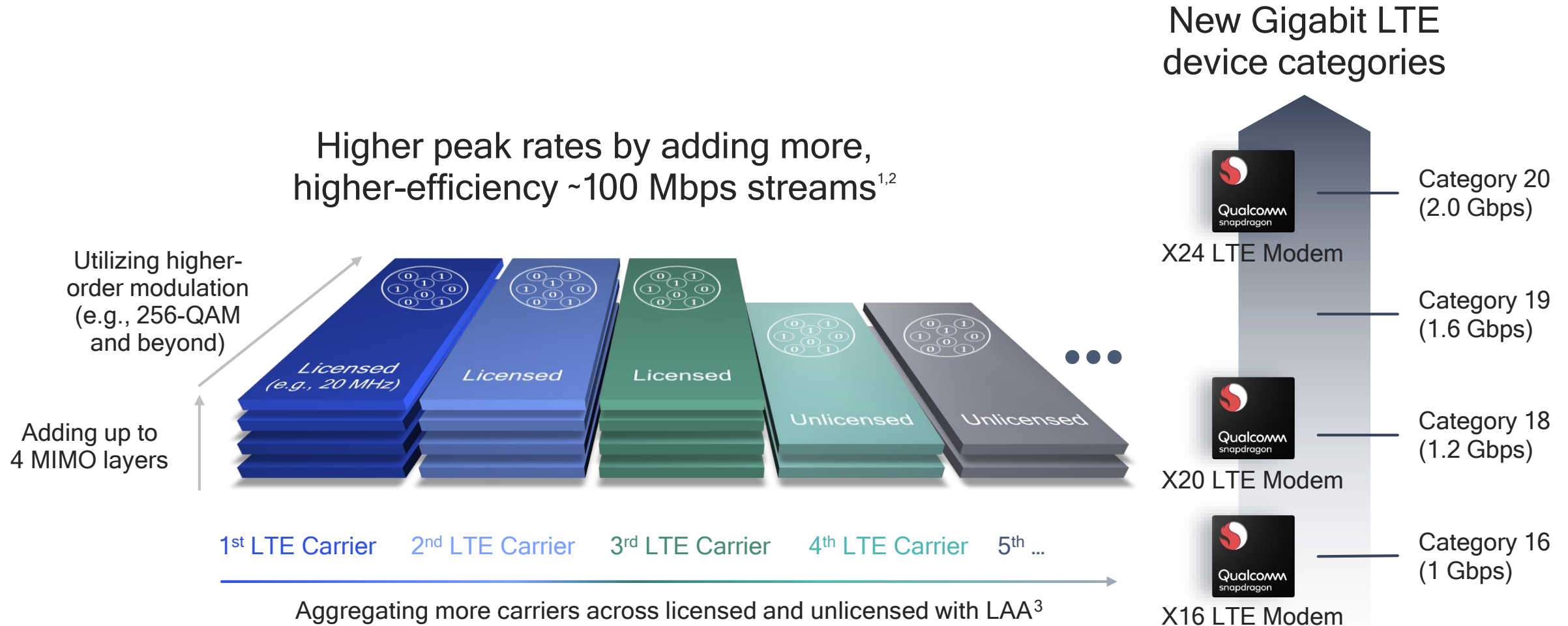
Based on real-world Gigabit LTE network testing by Signals Research Group

Download the full report – <https://www.qualcomm.com/media/documents/impact-gigabit-lte-technologies-user-experience>

Gigabit LTE continues to evolve in multiple dimensions



Achieving peak throughputs up to 2 Gbps



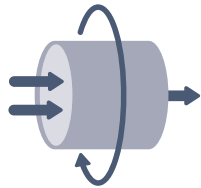
Which Chipsets support Gigabit LTE?

Portfolio of Gigabit LTE Products

1st Gigabit LTE Generation



Qualcomm
snapdragon
X16 LTE modem



4xCA



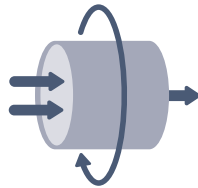
1.0 Gbps



10 streams



Qualcomm
snapdragon
X20 LTE modem



5xCA



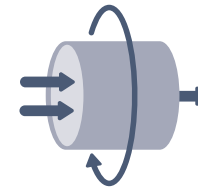
1.2 Gbps



12 streams



Qualcomm
snapdragon
X24 LTE modem



7xCA



2.0 Gbps



20 streams

2nd Gigabit LTE Generation

3rd Gigabit LTE Generation



Qualcomm snapdragon X24 LTE modem

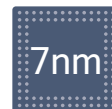
Our best LTE modem
yet - unprecedented
user throughput
enabling breakthrough
mobile performance



World's first
announced

**2 Gbps
LTE
modem**

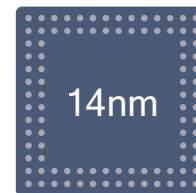
Breakthrough
mobile user
experience



World's first
announced

**7nm
Chip**

Lower power,
smaller
footprint*



World's first
announced

**14nm
RF Chip**

Better power
efficiency*



World's first
announced

**7x Carrier
Aggregation**

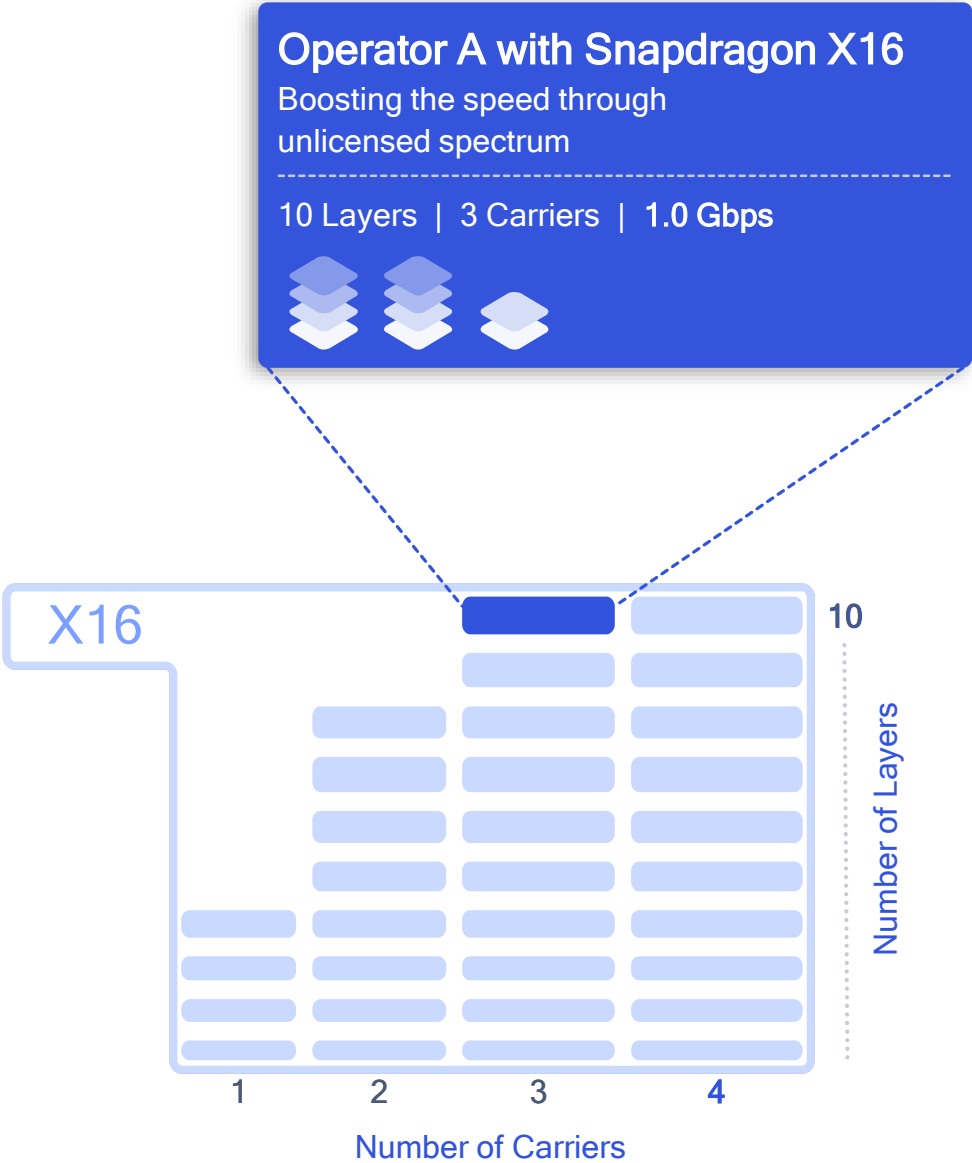
Expanded
Gigabit
footprint

*Compared to larger feature size fabrication processes.

Snapdragon X24: Full utilization of operator spectrum

7xCA and 20 spatial
streams allow wider
variety of ways to
deploy Gigabit LTE

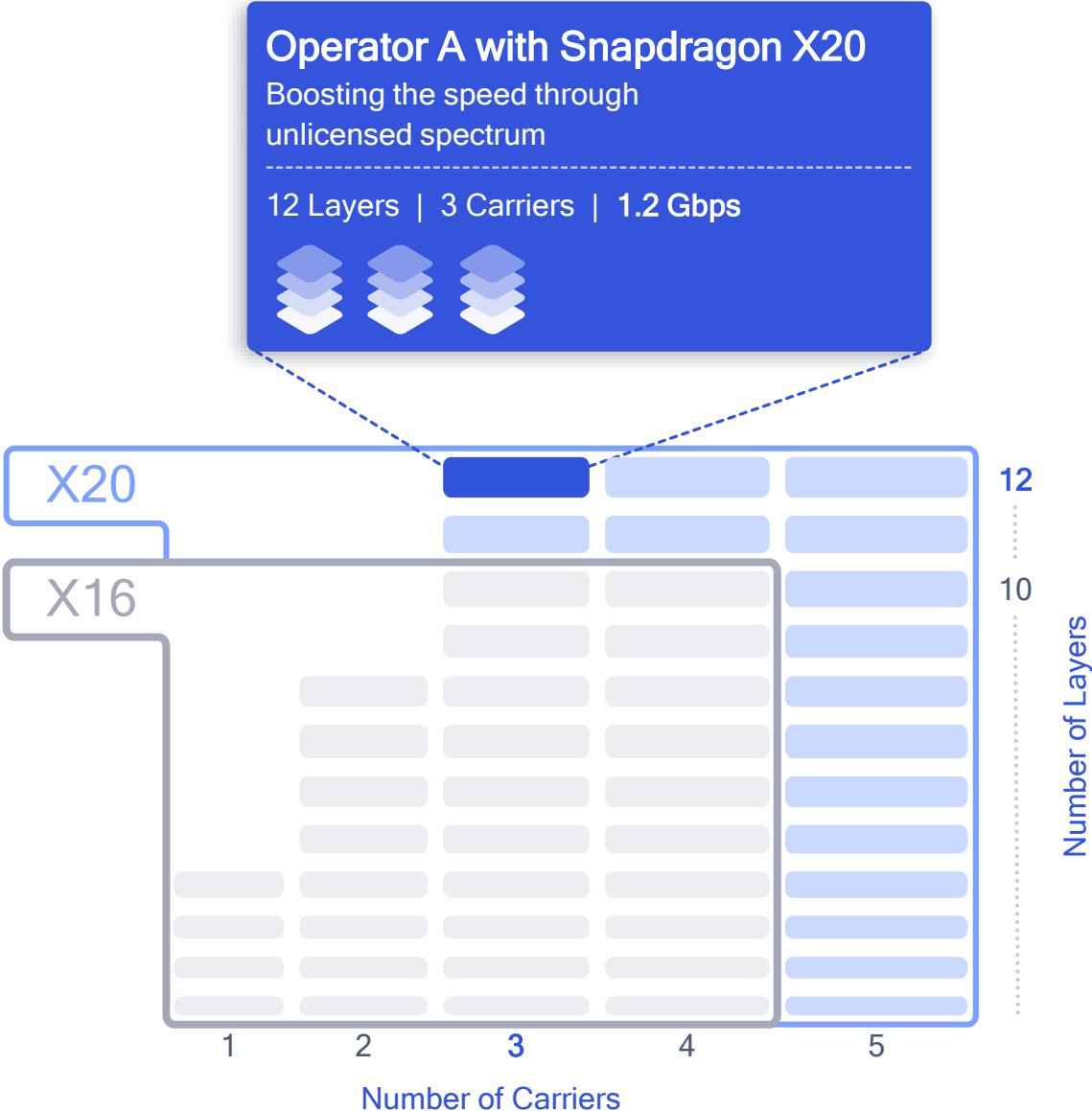
More advanced modem
allows operator to tap into
all existing spectrum
resources, and add more
capacity via LAA.



Snapdragon X24: Full utilization of operator spectrum

7xCA and 20 spatial
streams allow wider
variety of ways to
deploy Gigabit LTE

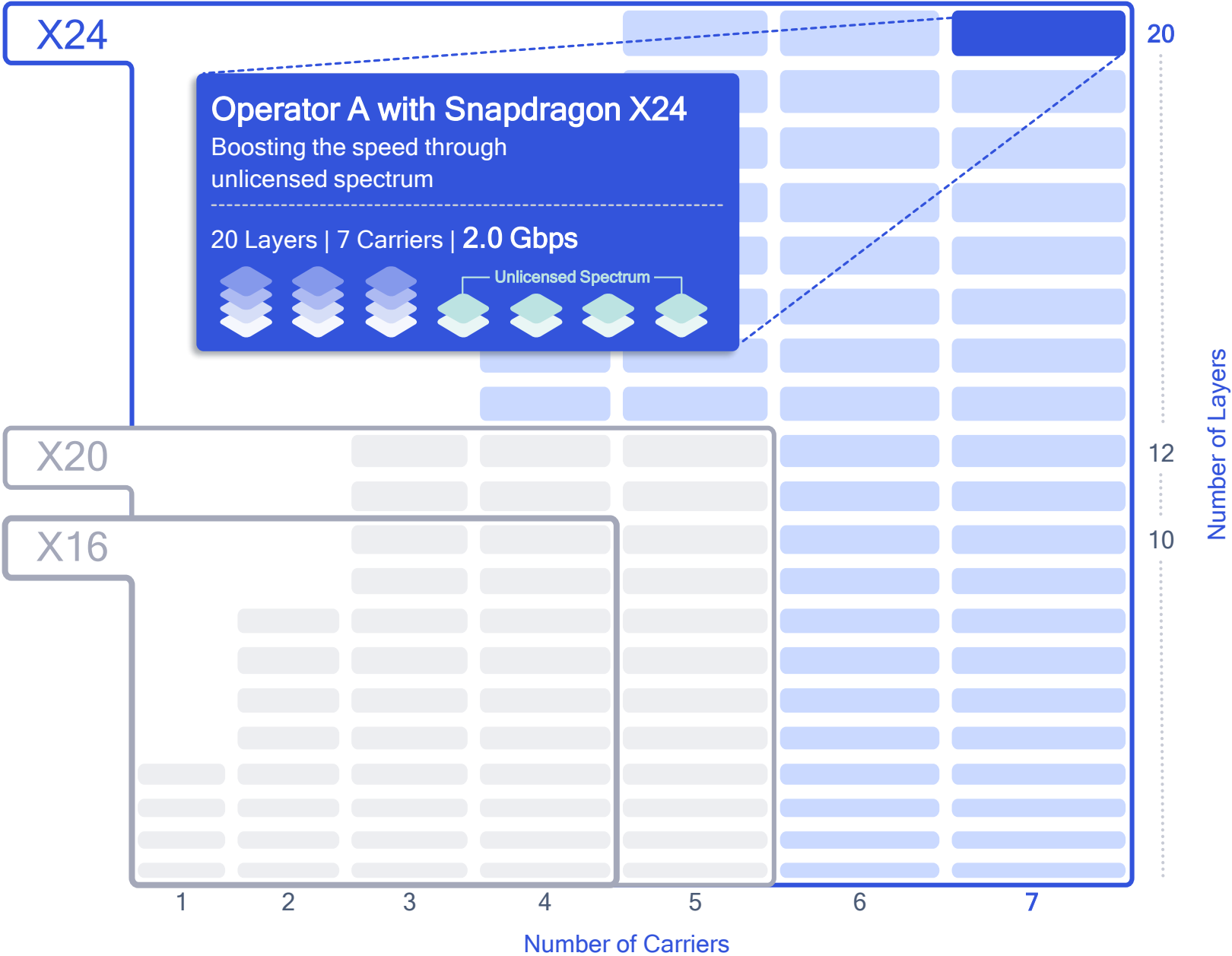
More advanced modem
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all existing spectrum
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Snapdragon X24: Full utilization of operator spectrum

7xCA and 20 spatial
streams allow wider
variety of ways to
deploy Gigabit LTE

More advanced modem
allows operator to tap into
all existing spectrum
resources, and add more
capacity via LAA.



Delivering new levels of performance and efficiency

Also enabling a more consistent 5G experience when 5G NR rolls out



Frankfurt
Gigabit LTE vs. Cat-12
Macro + small cells

~3x
increase
in burst rate

~2.8x
faster
responsiveness

~2x
higher spectral
efficiency



San Francisco
Gigabit LTE vs. Cat-12
Macro + small cells

~3.2x
increase
in burst rate

~4x
faster
responsiveness

~2.2x
higher spectral
efficiency

5G NR Rel-15¹ eMBB expands to new spectrum bands

5G spectrum – low, mid, and high

Scalable numerology to support a wider range of spectrum bands



1. 3GPP Rel-16+ will bring continued eMBB evolution, plus new features for massive IoT and mission-critical

New mid-band spectrum

Expanding to new frequency bands leveraging existing cell sites

mmWave spectrum

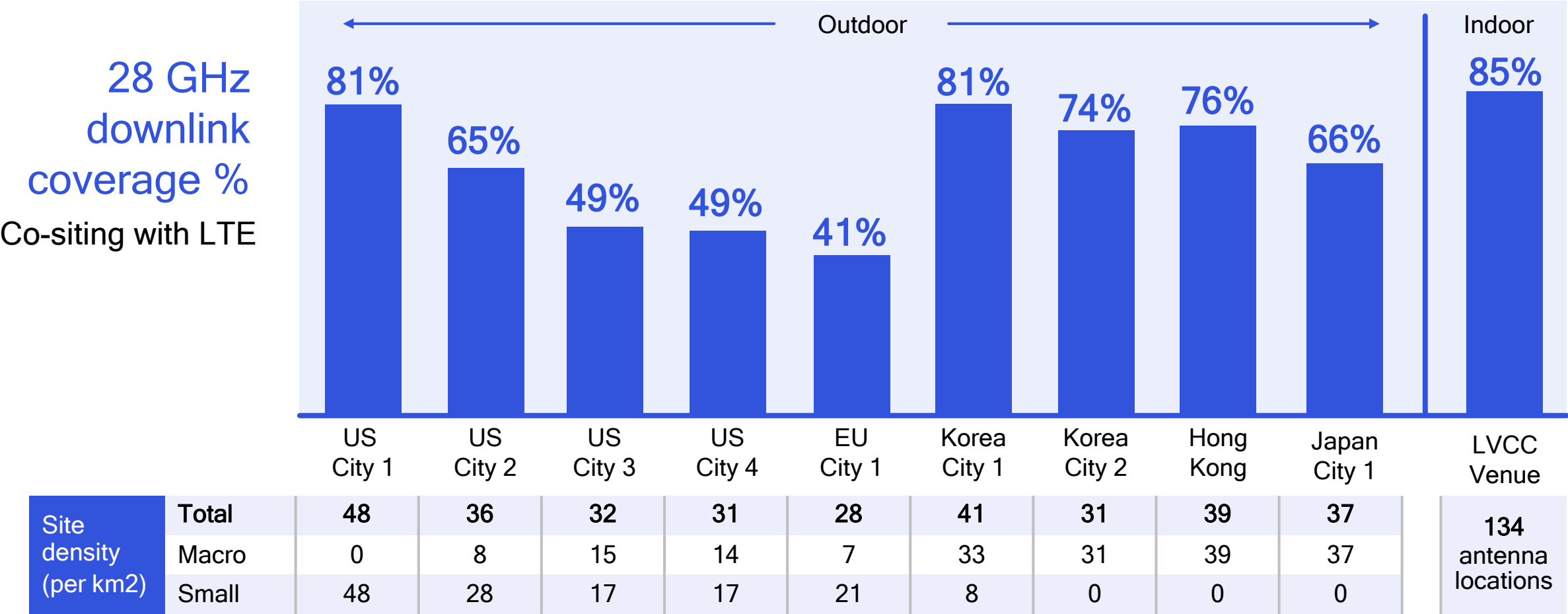
LTE/5G NR in existing low/mid bands provides the anchor

Excels in wider bandwidths

Improved performance, efficiency, and ability to leverage even more antennas

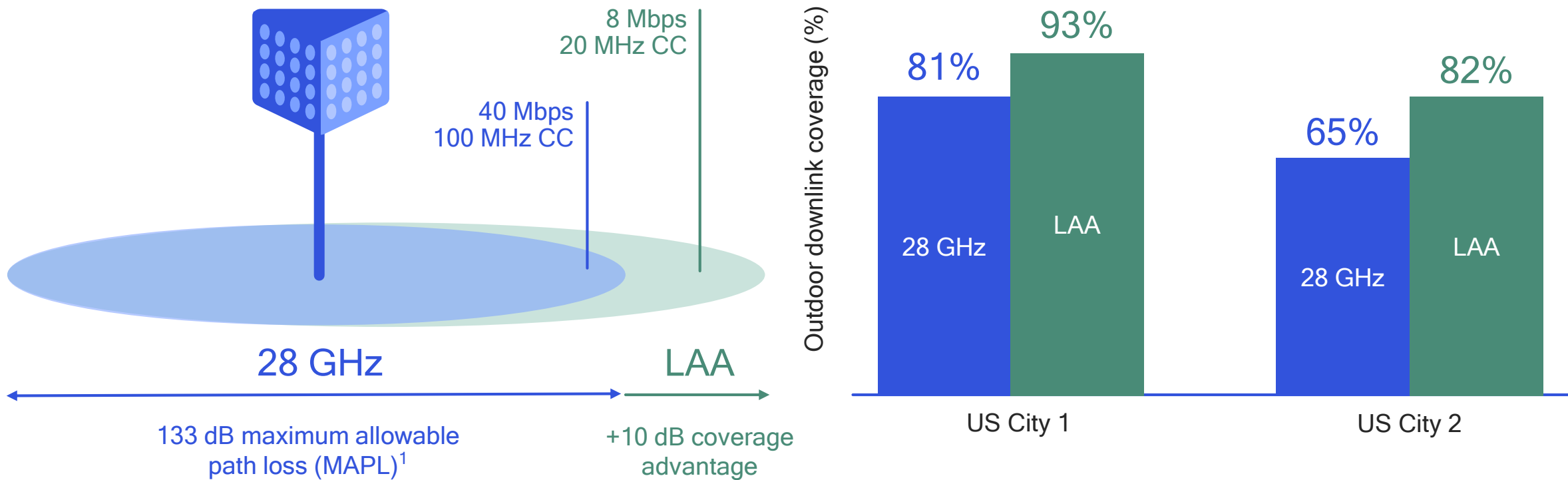
Significant 5G NR mmWave coverage via co-siting

Simulations based on extensive over-the-air testing and channel measurements



Leveraging LAA small cells used for Gigabit LTE to deliver significant 5G NR mmWave coverage

LAA vs. 28 GHz coverage²



Source: Qualcomm Technologies, Inc. 5G NR mmWave Network Coverage Simulation;
1. Link budget based on assumptions; additional variations possible due to temporary blockage – field measurements to follow; 2. Target spectral efficiency of 0.4 bps / Hz

Industry-first simulation of real world performance reveals immense 5G user experience gains over 4G



Frankfurt
5G NR multi-mode
3.5GHz (sub-6GHz)

5x

increase
in capacity

>490Mpbs

median
browsing speed

~7x

faster
responsiveness



San Francisco
5G NR multi-mode
28GHz mmWave

5x

increase
in capacity

1.4Gpbs

median
browsing speed

~23x

faster
responsiveness

Qualcomm

5G NR

Anyone can talk about 5G.
We are making it a reality.

Learn more at www.qualcomm.com/5G



Enhanced Mobile
Broadband



Mission-critical
services



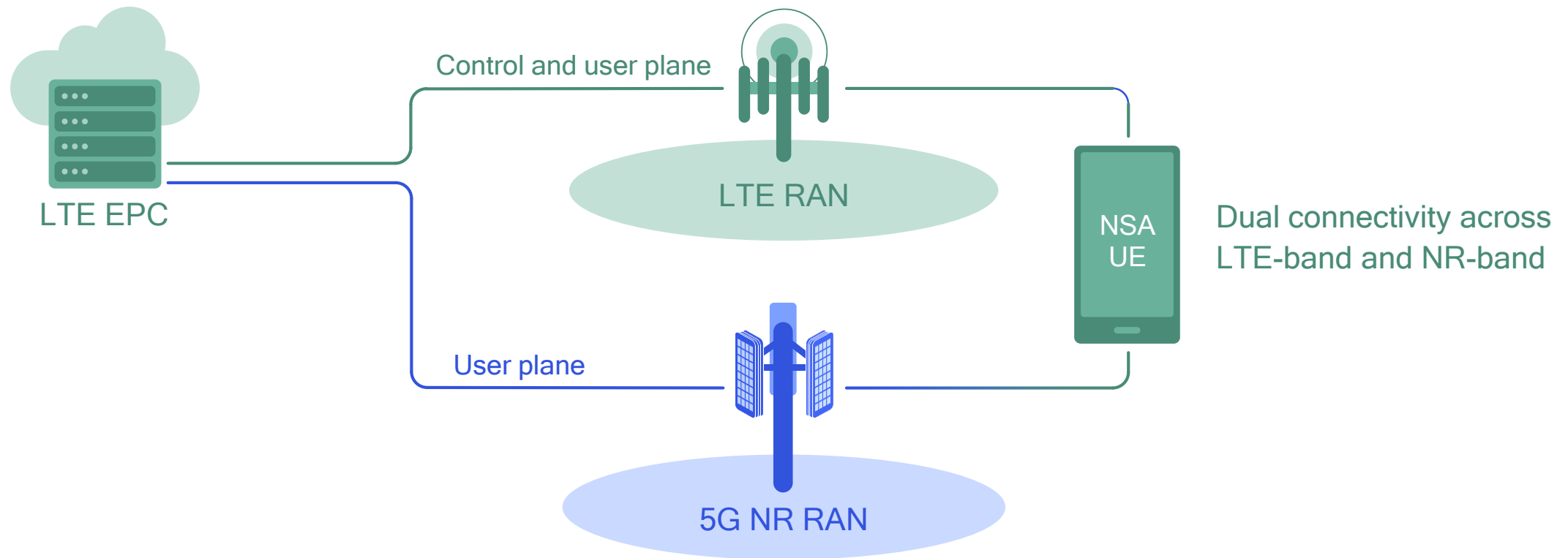
Massive Internet
of Things

We have led the evolution and expansion of LTE

Our fundamental systems-level inventions are leading the world to 5G

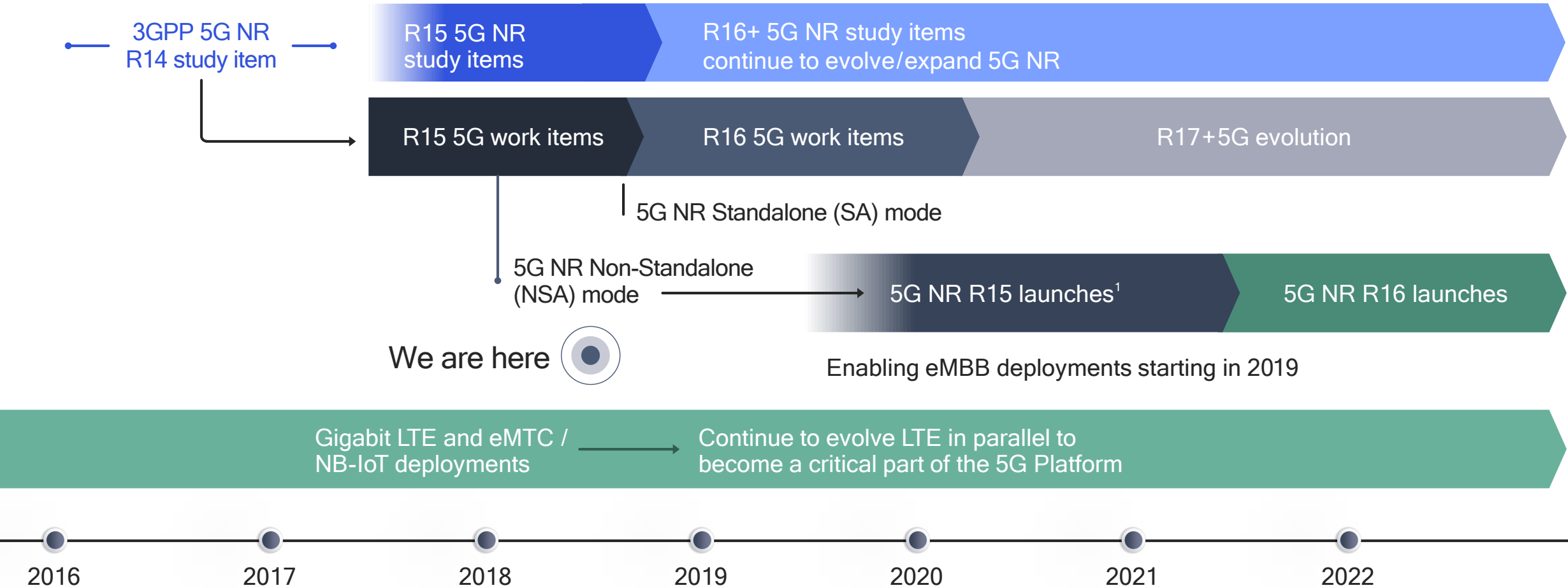


LTE is essential in enabling early NSA 5G NR deployments



Non-Standalone (NSA) leverages LTE RAN and EPC for coverage and mobility, while introducing 5G NR to enhance the user plane performance and efficiency

Accelerating 5G NR to meet the ever-increasing global demand for mobile broadband

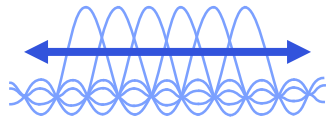


1. Forward compatibility with R16 and beyond

3GPP Rel-15 establishes a solid foundation for 5G NR

For enhanced mobile broadband and beyond

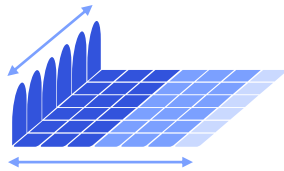
Scalable OFDM-based air interface



Scalable OFDM numerology

Efficiently address diverse spectrum, deployments and services

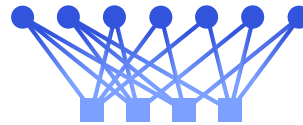
Flexible slot-based framework



Self-contained slot structure

Key enabler to low latency, URLLC and forward compatibility

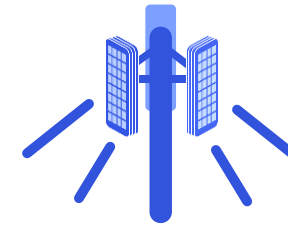
Advanced channel coding



ME-LDPC and CA-Polar¹

Efficiently support large data blocks and a reliable control channel

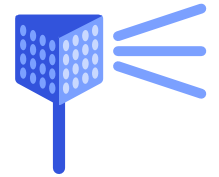
Massive MIMO



Reciprocity-based MU-MIMO

Efficiently utilize a large # of antennas to increase coverage / capacity

Mobile mmWave



Beamforming and beam-tracking

Enables wide mmWave bandwidths for extreme capacity and throughput

Qualcomm

Our technology inventions are driving Rel-15 specifications

Early R&D investments | Best-in-class prototypes | Fundamental contributions to 3GPP

Learn more at: <https://www.qualcomm.com/5gnr>

1. Multi-Edge Low-Density Parity-Check and CRC-Aided Polar

Making 5G NR a commercial reality for 2019

For standard-compliant networks and devices

Qualcomm



Best-in-class 5G prototype systems

Designing and testing 5G technologies for many years



5G NR standards and technology leadership

Our technology inventions are driving the 5G NR standard



5G NR interoperability testing and trials

Leveraging prototype systems and our leading global network experience

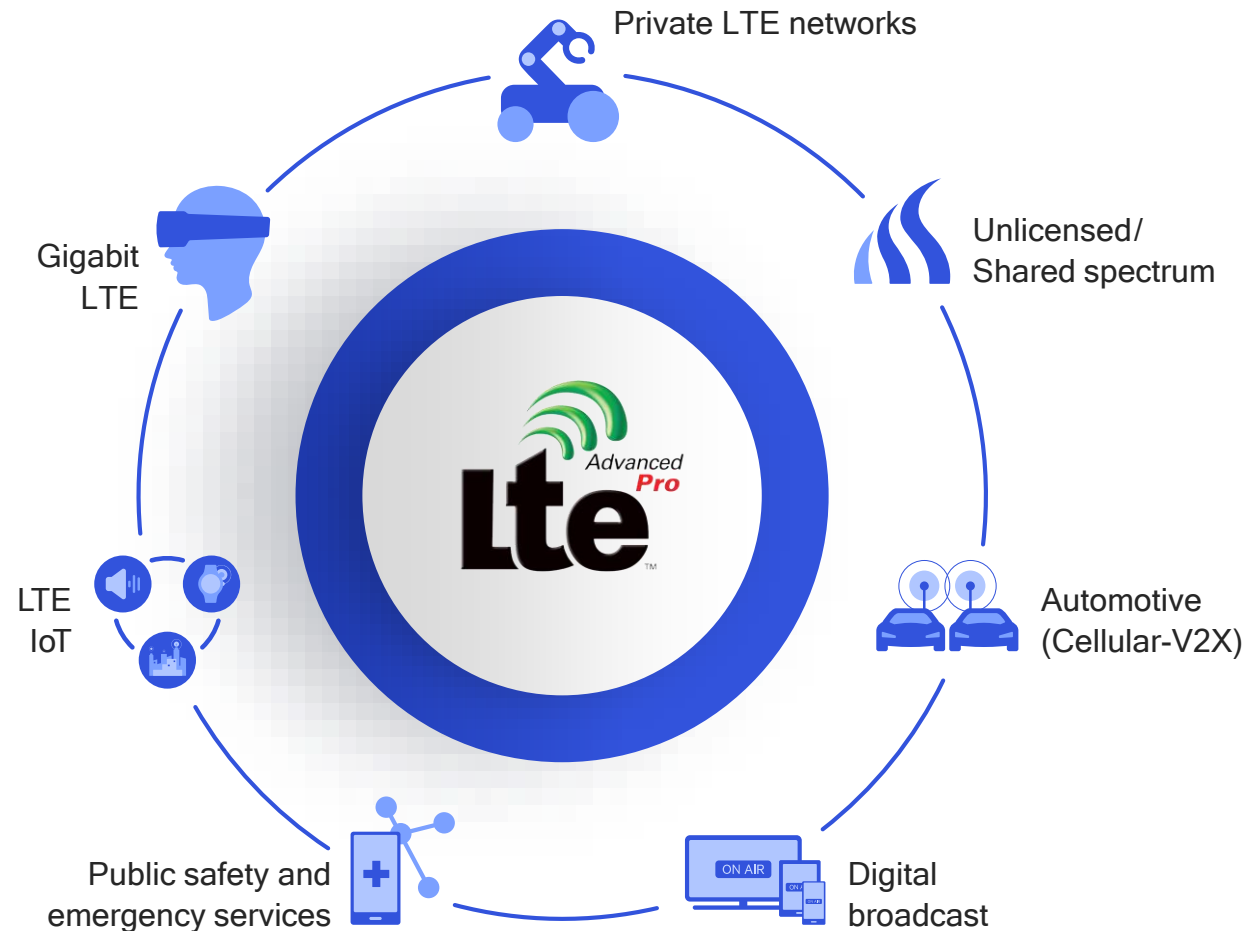


Modem and RFFE leadership

Announced the Qualcomm Snapdragon X50 5G modem family

————— LTE foundational technologies —————→

LTE Advanced Pro accelerates the 5G mobile expansion



LTE IoT, private LTE network, C-V2X are enabling new mobile use cases today




Gigabit LTE is here now and delivers a seamless 5G mobile experience

LTE will be submitted with 5G NR to meet IMT-2020 requirements

5G NR will fully leverage LTE investments and enable a phased roll-out



Thank you!

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