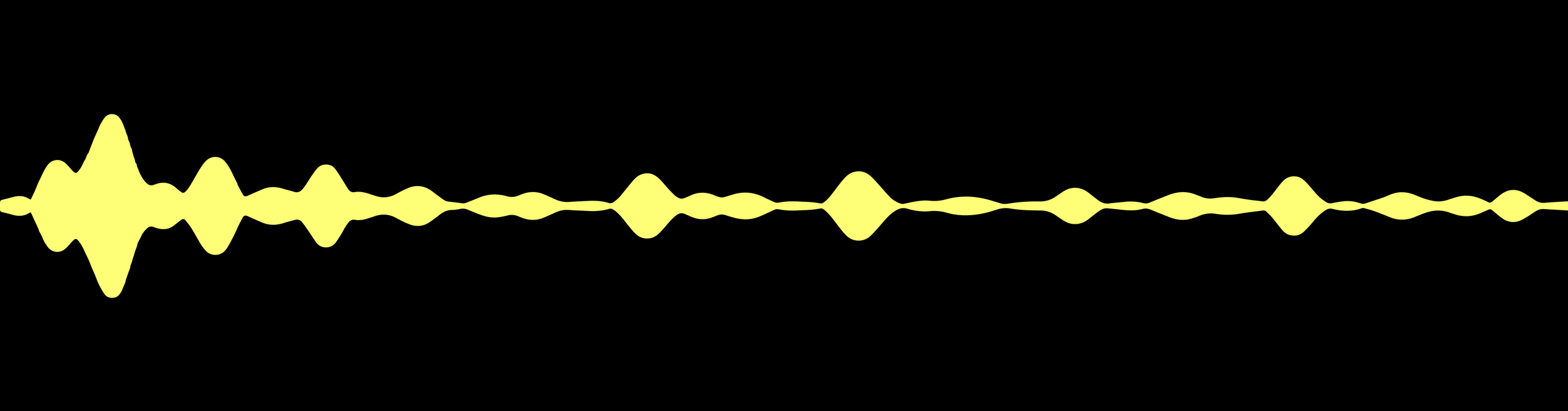
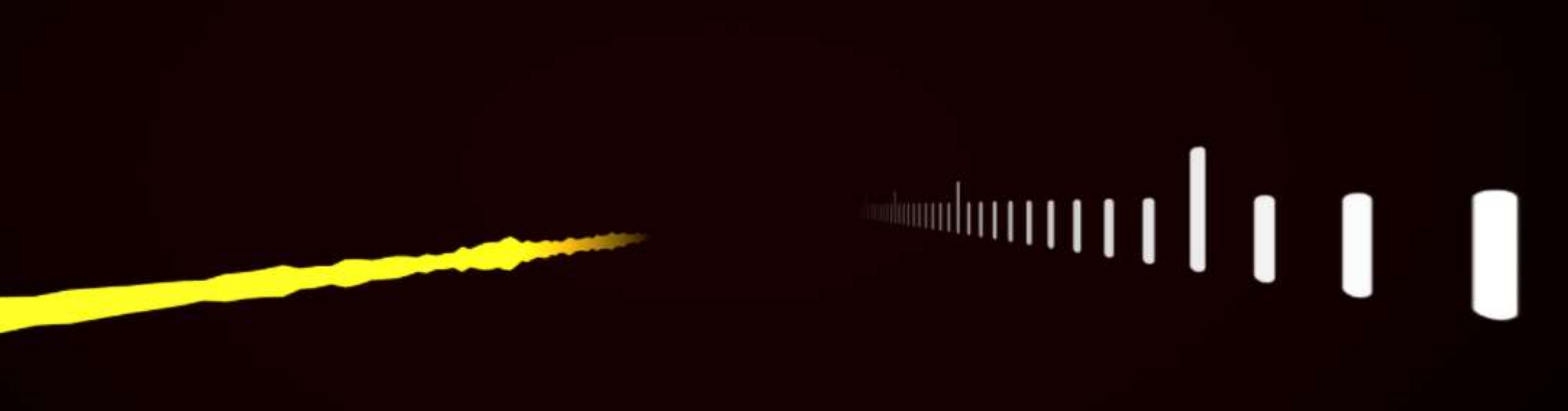
A truly connected world: How 5G will change everything

Matt Grob
Executive Vice President, Qualcomm Technologies, Inc.
and Chief Technology Officer
@grobmatt #whywait






QUALCOMM
AMBULANCE




1910


1960


1980
1G


1990
2G


CDMA Transmitter
3G
2000


2010
4G

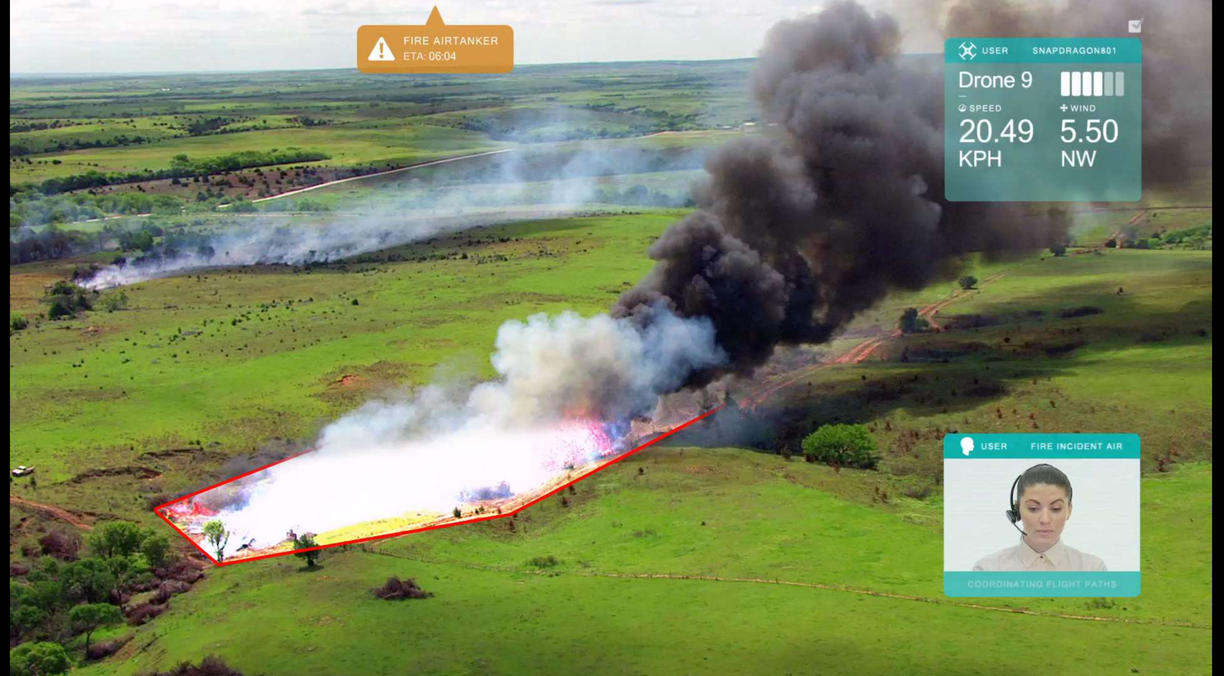
More than a new generation of mobile. A new kind of network.

Unifying connectivity fabric

Scalable across many dimensions

Intelligence at device, edge, and the cloud


MPH
60
0.00


FIRE AIRTANKER
ETA: 06:04
USER
SNAPDRAGON801
Drone 9
SPEED
20.49
KPH
WIND
5.50
NW
USER
FIRE INCIDENT AIR
COORDINATING FLIGHT PATHS

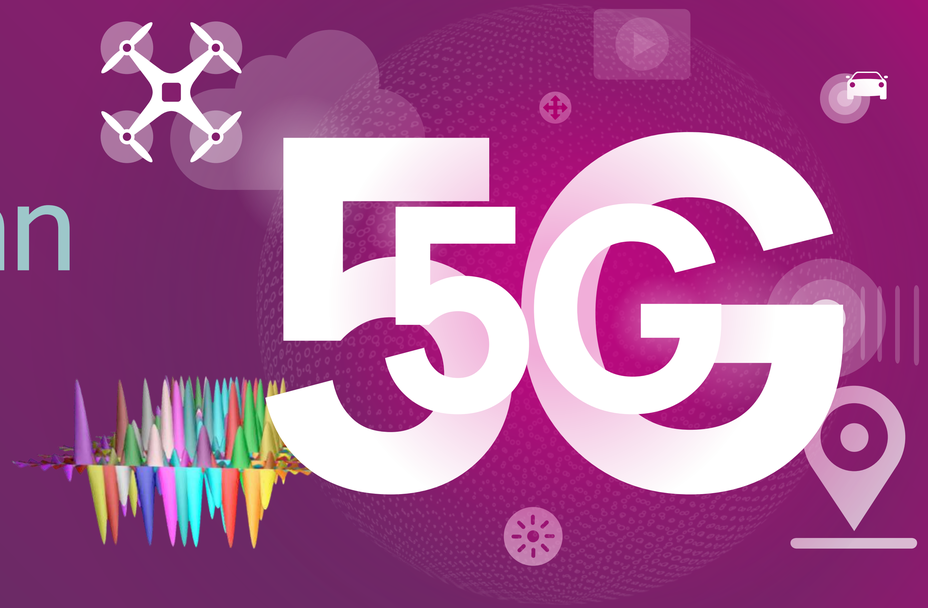
From vision to reality

Smashing
through barriers

Creating a rock solid
5G design

Delivering technology
on a global scale

Closer than you think



A new era of

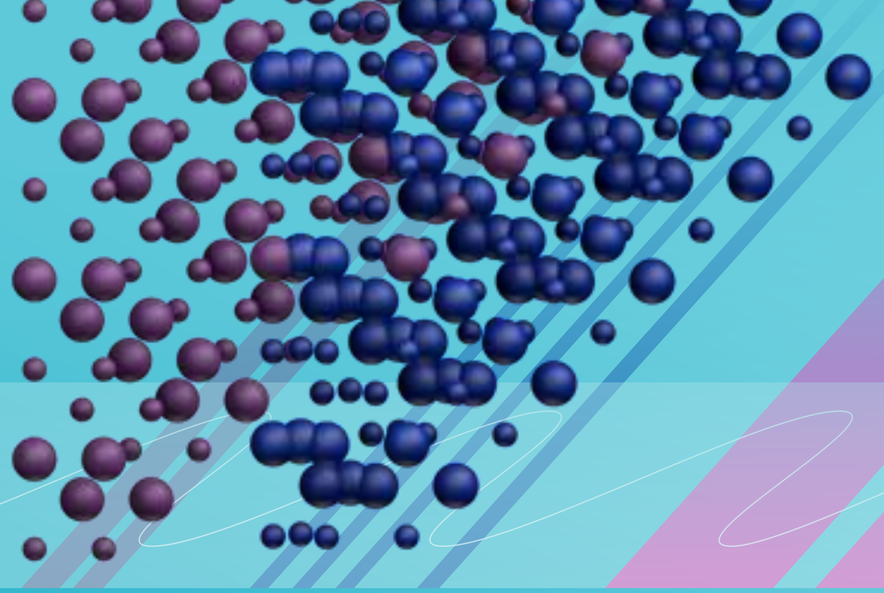
Immersive experiences

Multi-Gbps data rate	Low latency	Lower cost per bit


THE PROCESSORS
Why Wait
We start by asking questions
We must challenge what
we see today
So we can invent the
tech that shapes tomorrow
CHORUS
Purchase
JAMES
Afterparty @ the Space Club!
PHOEBE
Love this song!

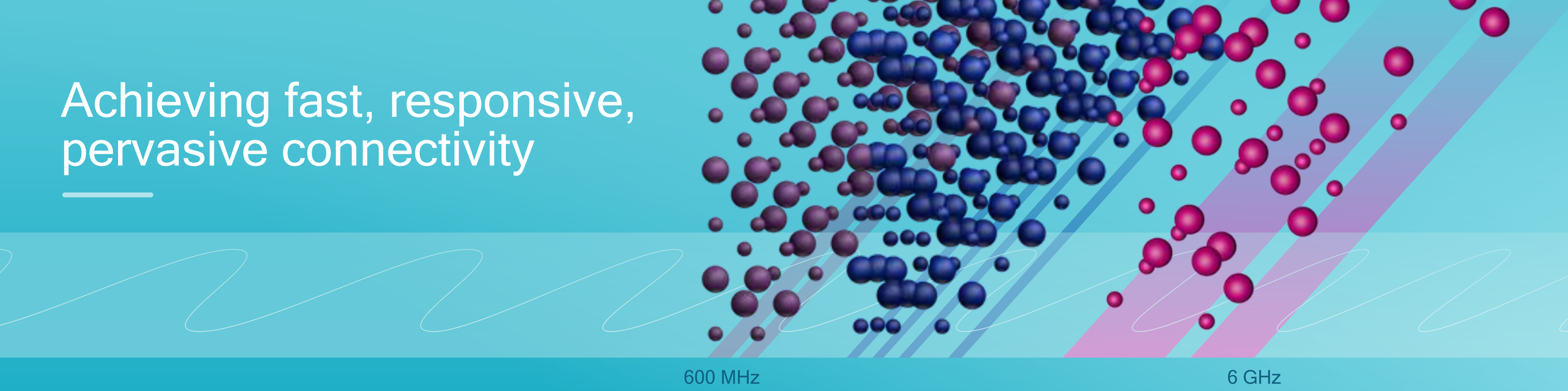
Achieving fast, responsive, pervasive connectivity

Achieving fast, responsive, pervasive connectivity

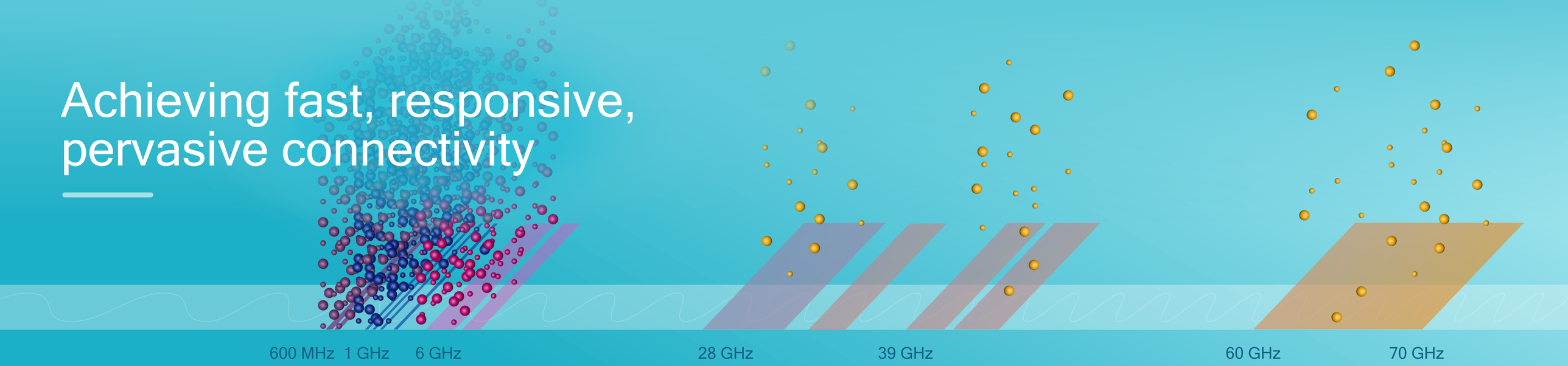


600 MHz

Achieving fast, responsive, pervasive connectivity

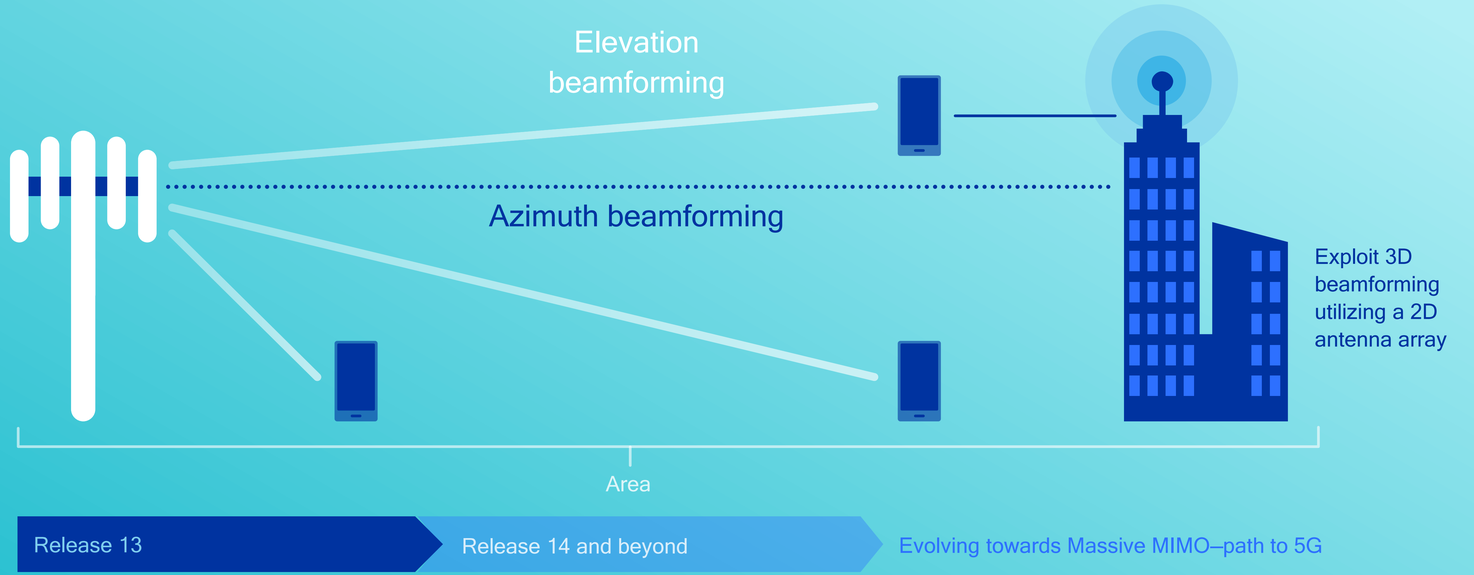


Achieving fast, responsive, pervasive connectivity



Advanced antenna techniques

A key enabler for higher spectrum bands



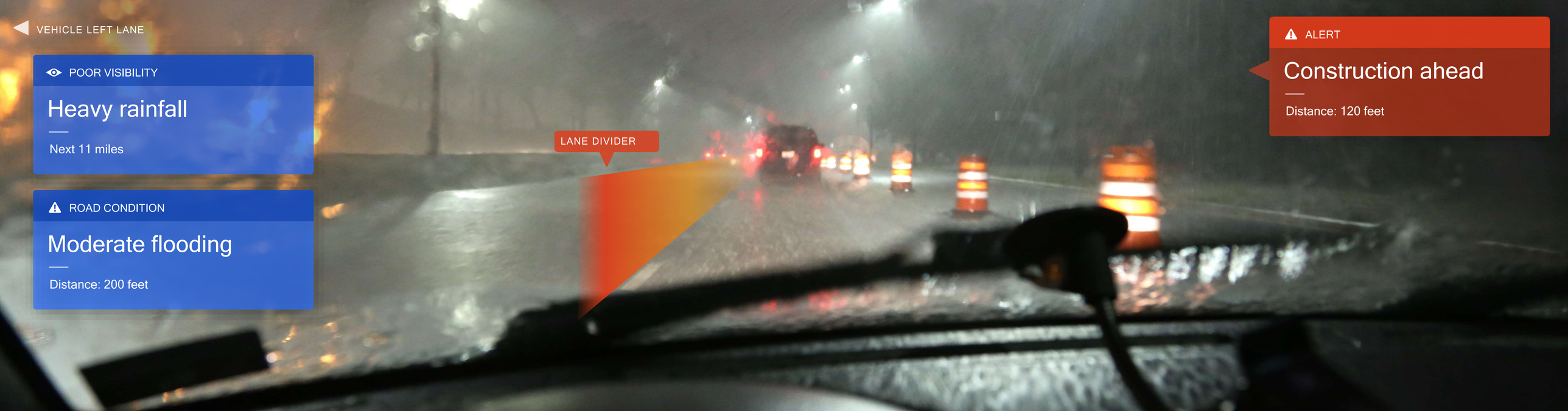
Technology enabling

A mission-critical world

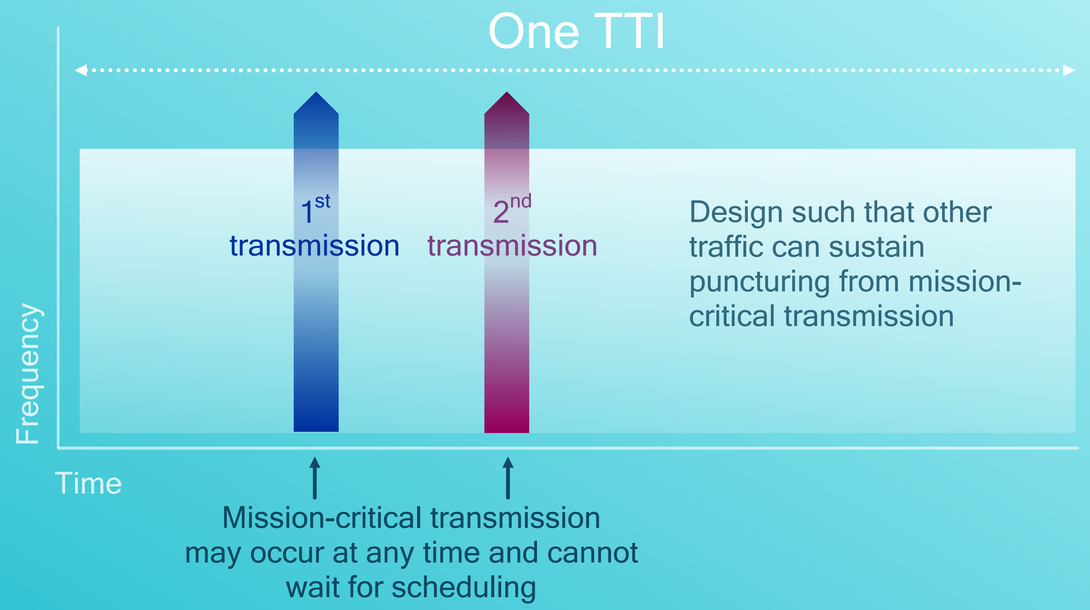
High reliability	Ultra-low latency	High availability

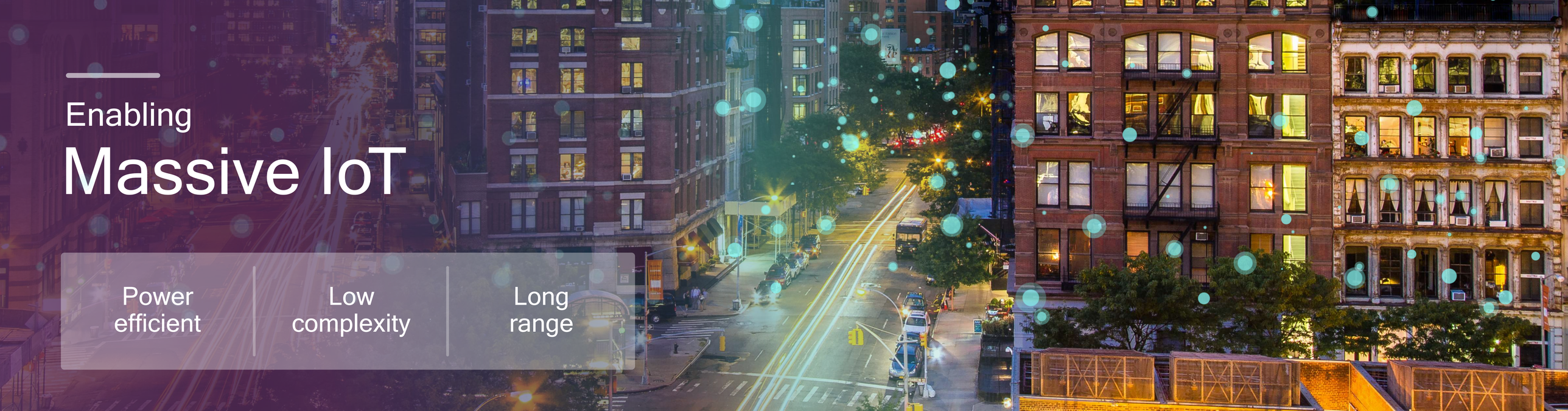

Washington General ER Room 3
PATIENT
Ashley Worley
Critical condition
74 bpm
100 %
10 rpm
NETWORK STATUS
Primary network
Secondary network
Secure data link


Sensor fusion compute
Computer vision
Parking space available near destination
Vehicle-to-cyclist
Speed limit 30
Charging station 300 feet ahead
Pedestrian entering crosswalk
Vehicle-to-vehicle
Smart traffic signal


VEHICLE LEFT LANE
POOR VISIBILITY
Heavy rainfall
Next 11 miles
ROAD CONDITION
Moderate flooding
Distance: 200 feet
LANE DIVIDER
ALERT
Construction ahead
Distance: 120 feet

Efficient mission-critical multiplexing with other services




Enabling
Massive IoT
Power efficient
Low complexity
Long range


Enabling
Massive IoT
Power efficient
Low complexity
Long range
TRAFFIC
Heavy. Use alt route.
AIR QUALITY INDEX
Good: 40 Ozone: 38 Particles (PM2.5): 54
STREETLIGHT
Small cell: ON
AMBIENT LIGHT
470 Lumens
ROAD CONDITION
20°C Humidity: 37%
TRASH BIN
85% capacity
64% recyclables
15% compostable
21% waste
SCHEDULED PICKUP
22:15 hours
REFRIGERATOR
Door open: 5 minutes
ENERGY EFFICIENCY
70% of peak
Wi-Fi access point: Active


ARTICULATED DUMPER 1
Autonomous
DUMP TRUCK 7
Manned
DUMP TRUCK 9
Manned
EXCAVATOR >> AUTONOMOUS
Miles
16
Trips
37
Hours
386.4
Emissions
2.3%
Hydraulics
61psi
Engine
79°C
Load
5.4T
Fuel
53%
Tires
42%
EXCAVATOR 6
Autonomous

Supporting vast scale with

Efficient IoT communication

High bandwidth
Greater complexity

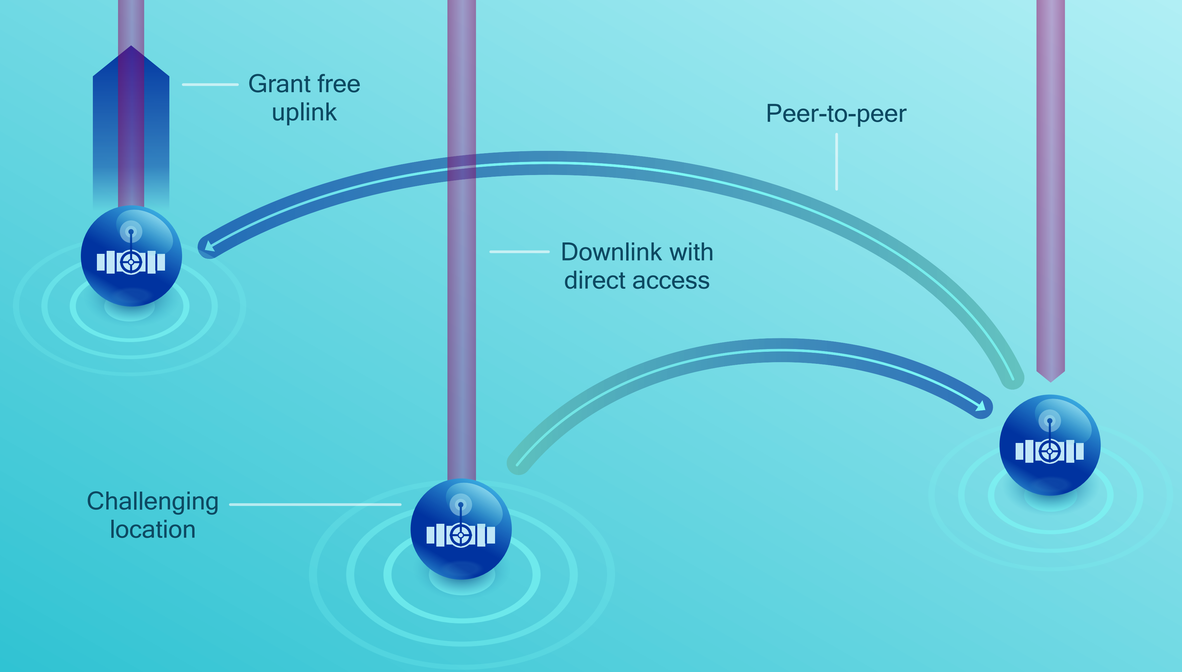
Low bandwidth
Deep coverage
High efficiency

Enabling massive numbers of

Low-complexity devices

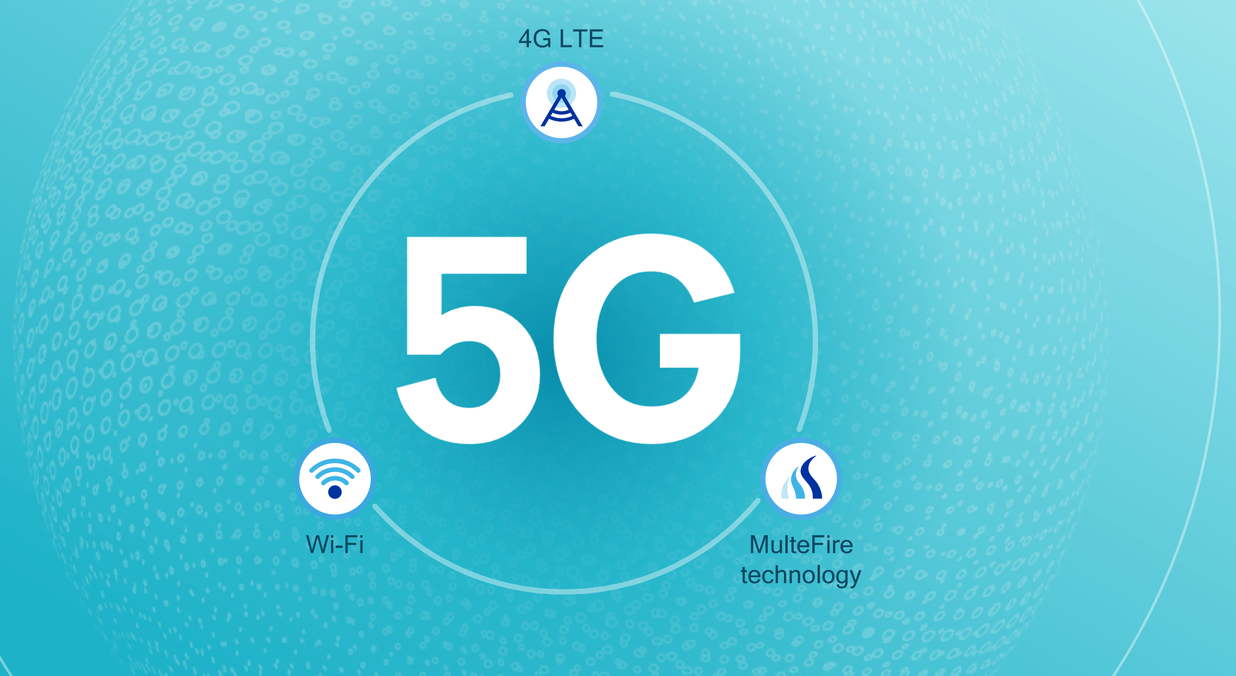
Enabling massive numbers of

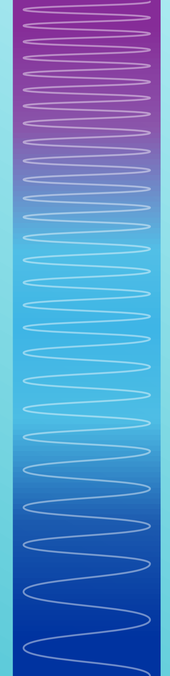
Low-complexity devices



One integrated system

Flexible framework for efficiently multiplexing diverse services





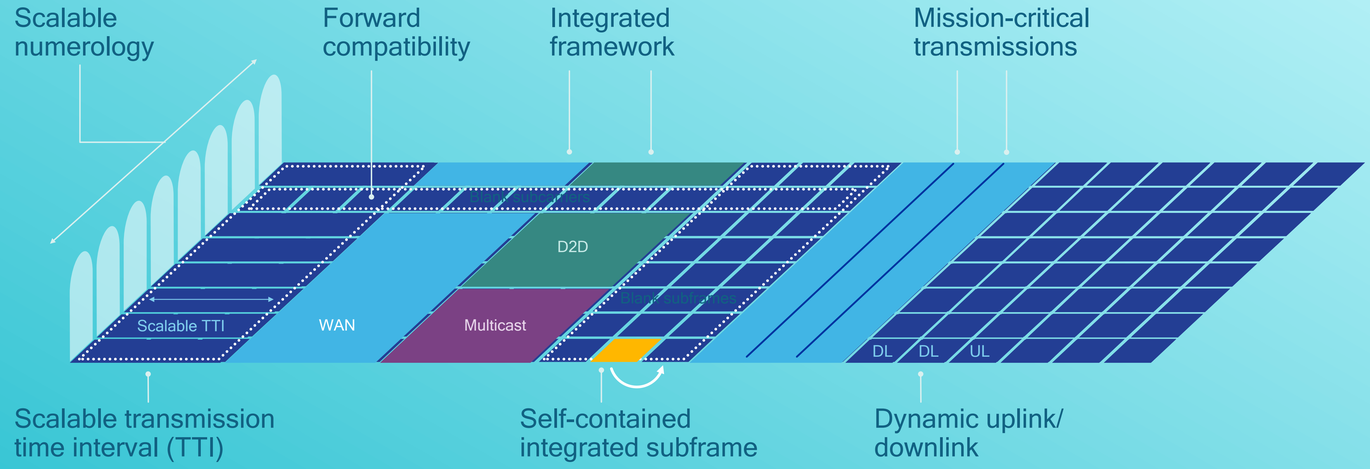
High bands above 24GHz (mmWave)

Mid bands 1GHz to 6GHz

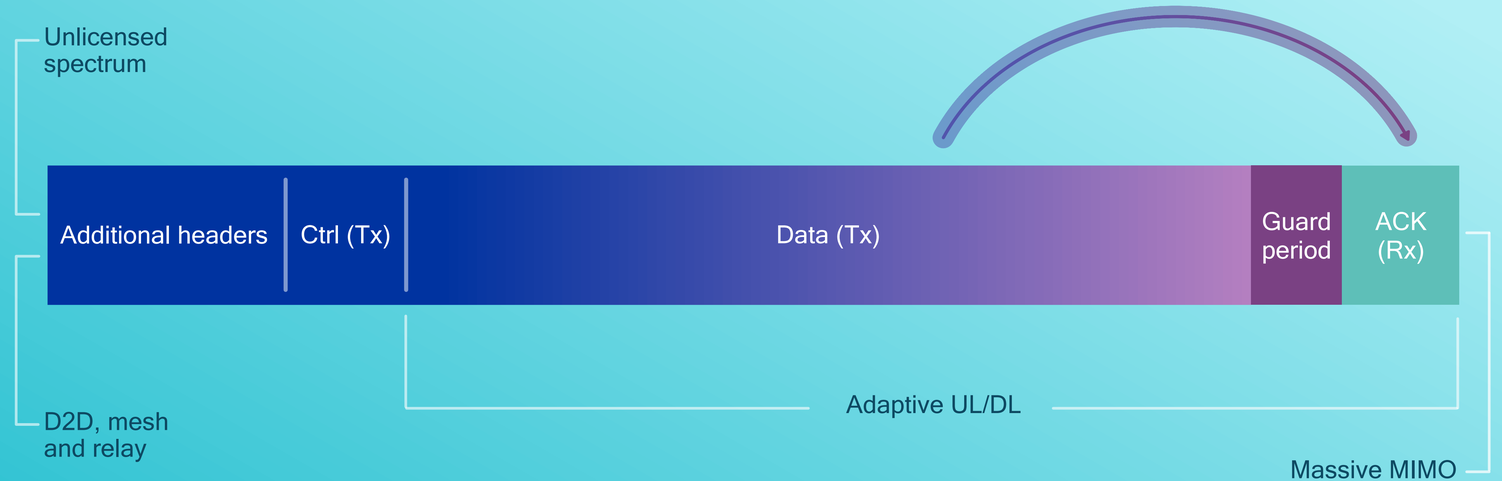
Low bands below 1GHz

A scalable OFDM-based 5G New Radio (NR)

Flexible framework for efficiently multiplexing diverse services



Self-contained, integrated TDD subframe design



Accelerating the path to 5G

Best-in-class 5G prototype systems and testbeds

3GPP™ A GLOBAL INITIATIVE

5G standards, technology and research leadership

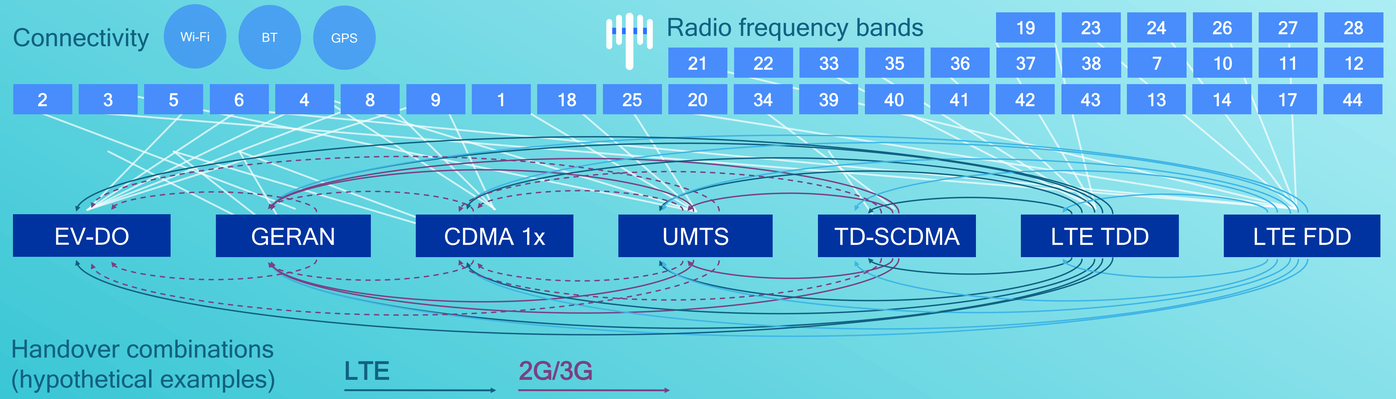
Impactful trials and early deployments with network operators

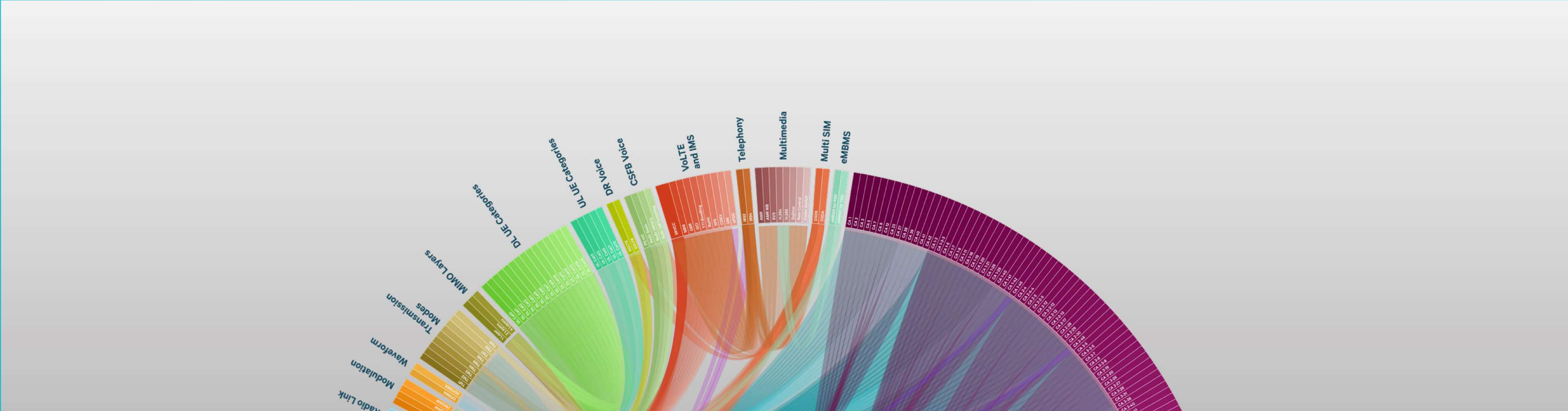
Modem and RFFE leadership to solve 5G complexity

Qualcomm Snapdragon is a product of Qualcomm Technologies, Inc.

Modem and RFFE leadership critical

Flexible framework for efficiently multiplexing diverse services



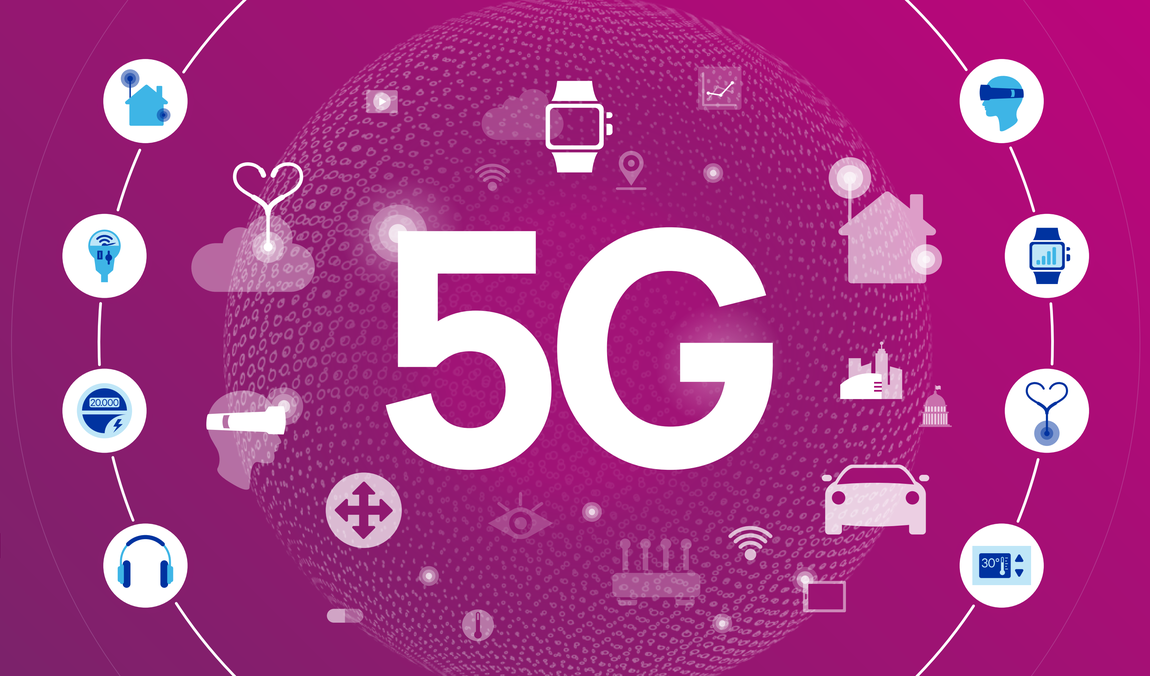

eMBMS
Multi SIM
Multimedia
Telephony
VoLTE and IMS
CSFB Voice
DR Voice
UL UE Categories
DL UE Categories
MIMO Layers
Transmission Modes
Waveform
Modulation
Radio Link

5G drives significant modem and RFFE complexity

Support for existing LTE networks and services

Efficient integration of new 5G spectrum, technologies/services

Power efficient and highly integrated chipset

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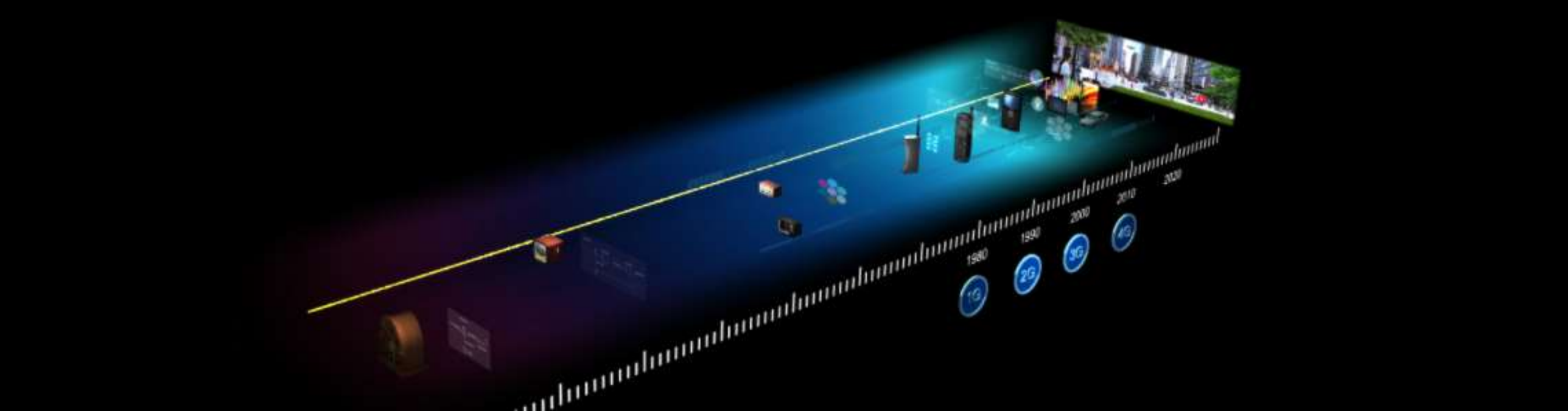
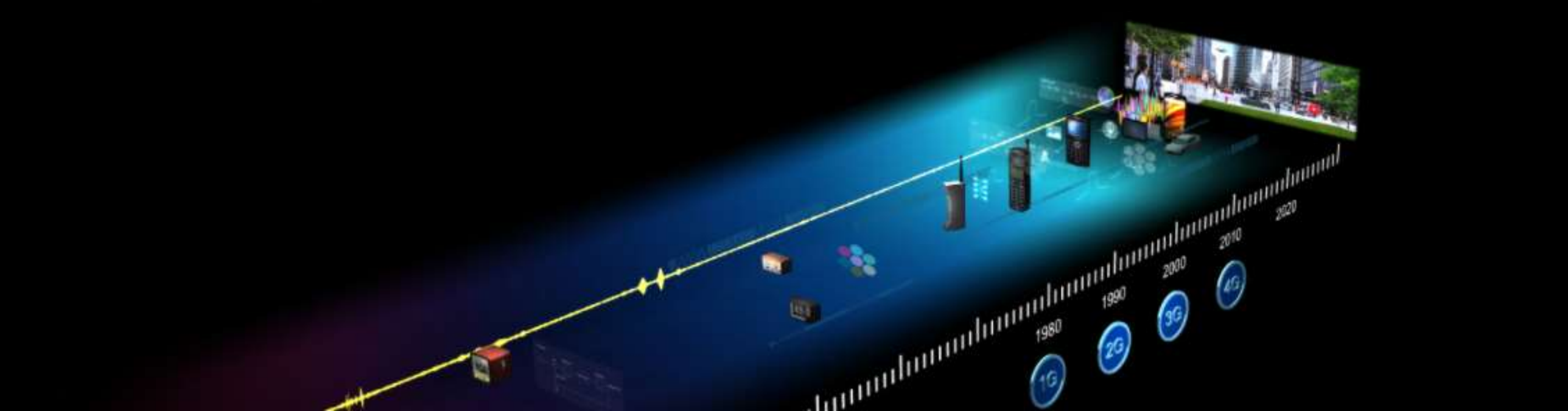

1980
1990
2000
2010
2020
1G
2G
3G
4G


1980
1990
2000
2010
2020
1G
2G
3G
4G

Leading the
world to 5G

Thank you

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