Wireless Solutions for Future Mobility

Dr. Chris Borroni-Bird,
VP, Strategic Development, Qualcomm Technologies, Inc. (QTI)

Forbes

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If you have a $500,000 portfolio, download the guide by *Forbes* columnist and money manager Ken Fisher's firm. It's called *The Definitive Guide to Retirement Income*. Even if you have so[illegible]lse in place right now, it *still* makes sense to request your guide! Click Here To Download Your Guide!
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Sam Abuelsamid Contributor
A lifetime in the car business, first engineering, now communicating
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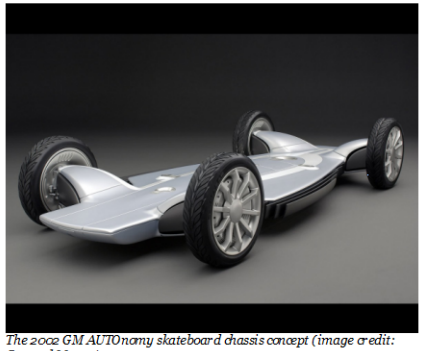
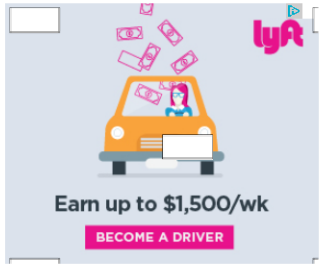
AUTOS 5/23/2016 @ 8:44AM | 14,028 views

Meet The Father Of The Auto 'Skateboard' Chassis Used By Tesla: Chris Borroni-Bird

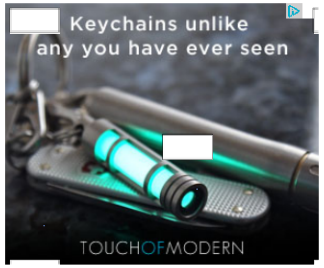


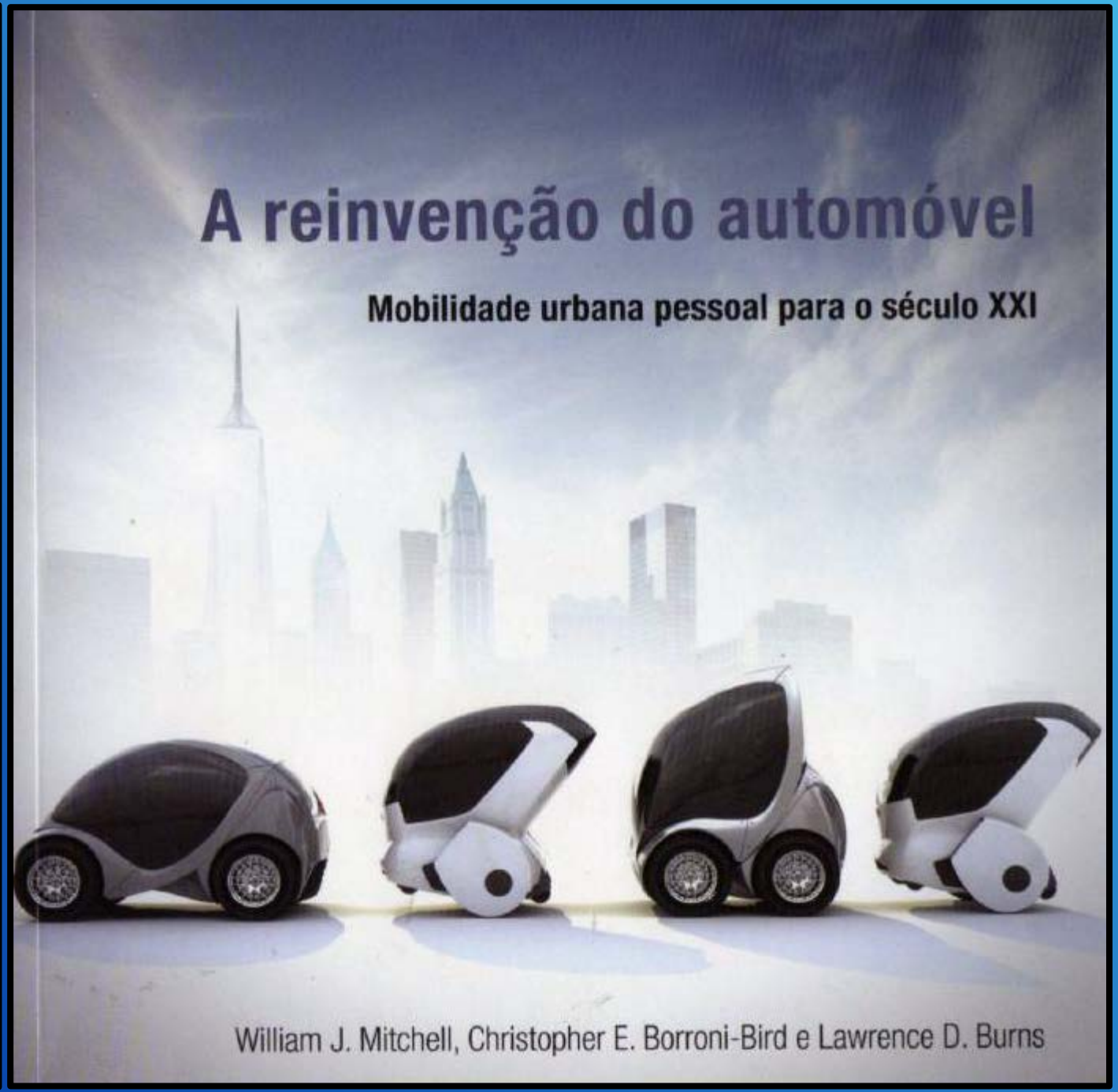
The 2002 GM AUTOnomy skateboard chassis concept (image credit: General Motors)



Elon Musk absolutely deserves a great deal of credit for popularizing the idea that a battery powered car could be a viable mainstream transportation product. The cult of personality around Musk is in large part the catalyst for Tesla securing 400,000 pre-orders for the Model III well before it goes on sale. Yet as in most industries there are those that work in far more anonymity than Musk while exerting much greater influence on the long-term future of that business. One of those influencers is Dr. Christopher Borroni-Bird, an engineer and researcher who has been helping to shape the future of mobility over the past two decades.

Borroni-Bird is currently vice-president of strategic development for Qualcomm Technologies, a company best known for the





Our technology is enabling the connected car experience today

Multimedia

Power Management

GPU

RF

Software/ HLOS

Position/ Location

Powerline

Ethernet

Security

Multi-OS support

DSP

Wi-Fi / DSRC

Bluetooth

Wireless EV Charging

3G/4G LTE

CPU

Computer Vision

Use cases for car connectivity continue to grow

Past

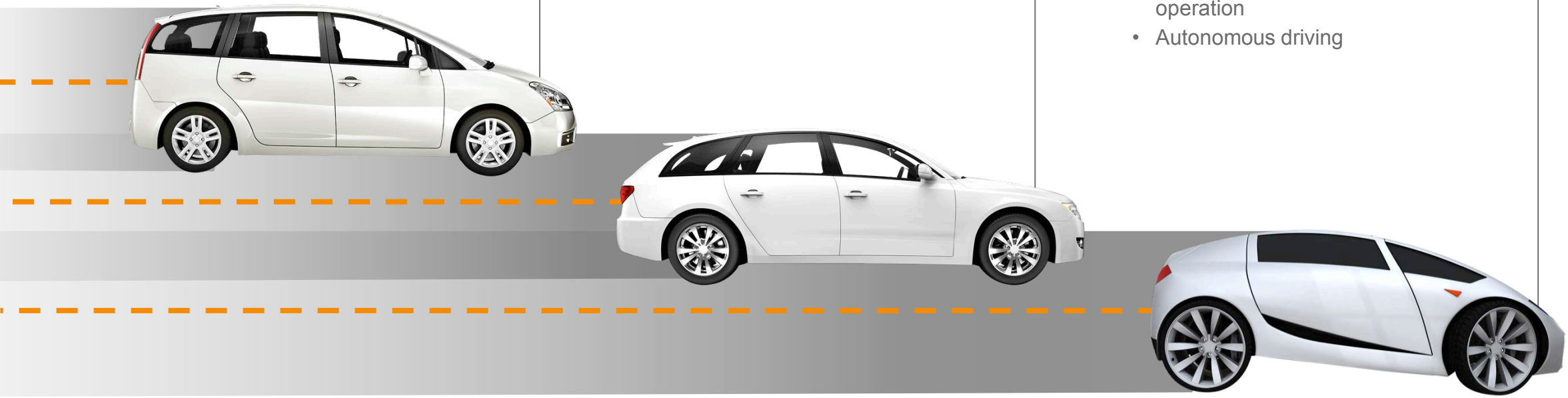
- Emergency crash notification
- Remote lock/unlock, start
- Stolen vehicle recovery
- Diagnostics

Present

- BYOD, Wi-Fi hotspot
- Connected navigation
- Infotainment
- Screen mirroring / projection
- System updates
- App-enabled vehicle management

Future

- Phone-based access and personalization
- Car sharing credentials management
- Post-sale upgrades
- Big data analytics
- ADAS / V2X
- Semi-autonomous operation
- Autonomous driving



Our vision for the always-connected vehicle of the future

A safer, more efficient, more enjoyable driving experience

Highly intelligent

Always connected

Increasingly autonomous

Highly secure

Increasingly electric (or hybrid)

Safer–towards zero road accidents

Greener–reduce air pollution & emissions

More predictable and productive travel

Delivering significant economic and societal impact

Total potential economic impact of over $1 Trillion USD per year[1]

Fewer driving fatalities/injuries

>1.2M

people die each year on the roads worldwide[2]

More predictable, productive travel

3.1B

gallons of fuels wasted due traffic congestion in the US[3]

Less greenhouse gas emissions

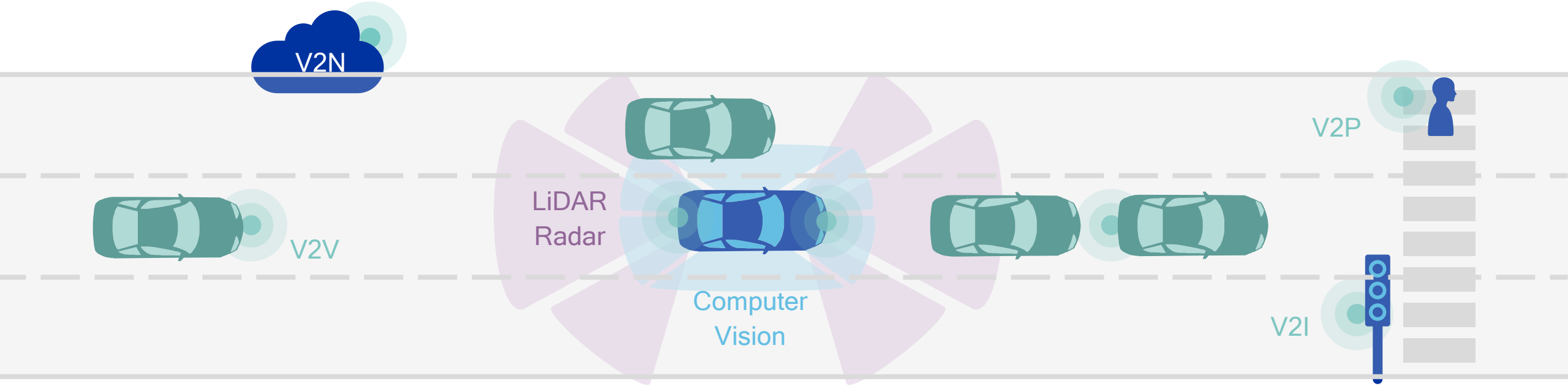
14%

of all global warming emissions from transportation[4]

[1] Rocky Mountain Institute 2016; [2] Global Status Report on Road Safety, World Health Organization 2015; [3] Texas Transportation Institute Urban Mobility Report, 2015;
[4] U.S, Environmental Protection Agency (EPA) 2014

V2X is a key technology enabler to enhanced ADAS

Bringing significant value to Advanced Driver Assistance Systems (ADAS)



Improved active safety

Provides 360° non-line-of-sight awareness, e.g. intersections/on-ramps, environmental conditions

Better traffic efficiency

Allows vehicles to safely drive closer to each other and enables optimization of overall traffic flow

Increased situational awareness

Provides ability to gather data from further ahead to deliver a more predictable driving experience

Vehicle to Pedestrian Communications

Honda and Qualcomm Technologies, Inc. collaborate on research for V2P safety applications

Honda

QUALCOMM®

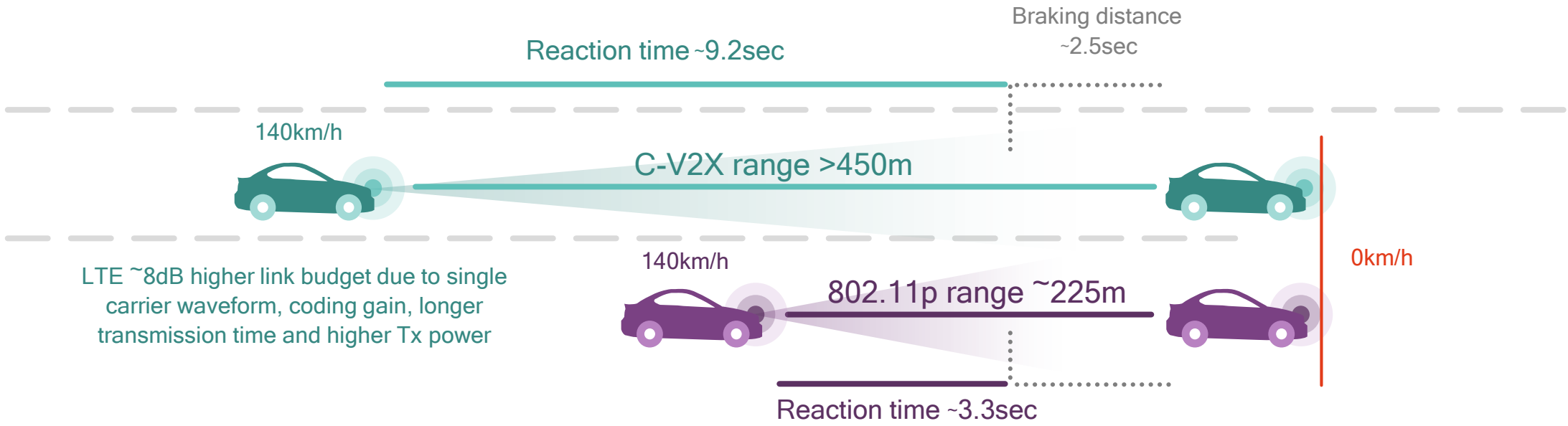
Vehicle-To-Pedestrian

Cooperative Safety Application

Pedestrian Accident Avoidance Technology

C-V2X increases reaction time over 802.11p/DSRC

For improved safety use cases – especially at high-speeds, e.g. highway



Safer driving experience

Increased driver reaction time

Support for high speeds

Relative speeds up to 500km/h

Increased situational awareness

Gather data from further ahead

Based on link level curves and the 3GPP LOS path loss model @ 10% Packet Error - Actual performance varies significantly with vehicle density and environment

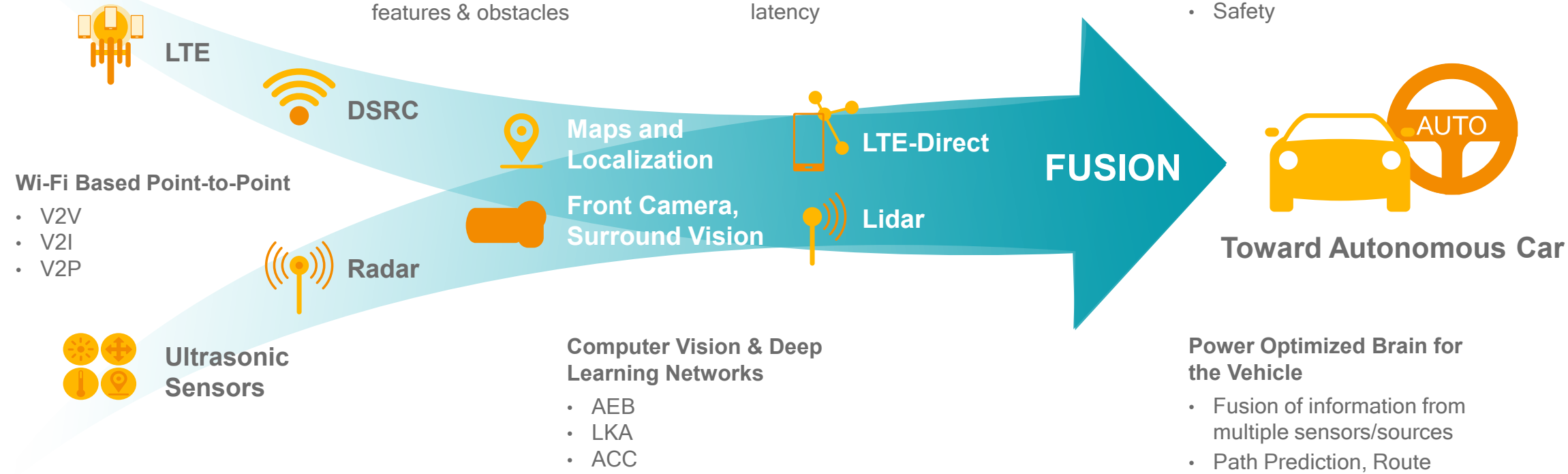
Autonomous vehicle technology enablers

Support for server computing & route planning (V2C)

Navigation & Path Prediction
- Real-time obstacles on road features & obstacles

Direct Connect using LTE-Direct
- Reduced bandwidth & improved latency

Supporting Technologies
- Security
- Safety



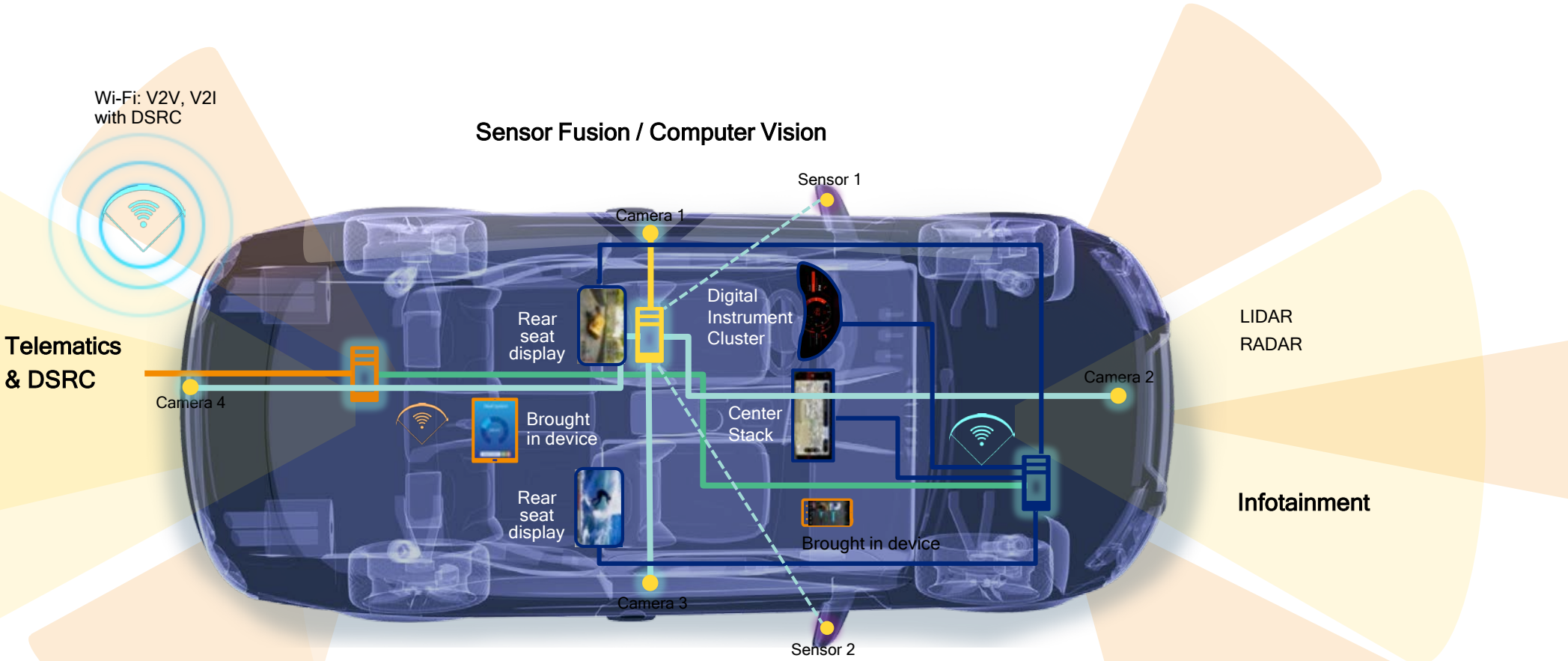
Wi-Fi Based Point-to-Point
- V2V
- V2I
- V2P

Toward Autonomous Car

Computer Vision & Deep Learning Networks
- AEB
- LKA
- ACC
- TSR

Power Optimized Brain for the Vehicle
- Fusion of information from multiple sensors/sources
- Path Prediction, Route Planning, Control Feedback

Automotive Platform



- Entertainment, Real-time Navigation & Safety Domains
- Sensor on Wheels

- Hub for Big Data
- Massive Processing Engine
- Always Connected – P2P and Cloud

Telematics
Infotainment
Sensor & Vision Processing

Integrated SoC improves costs effectiveness

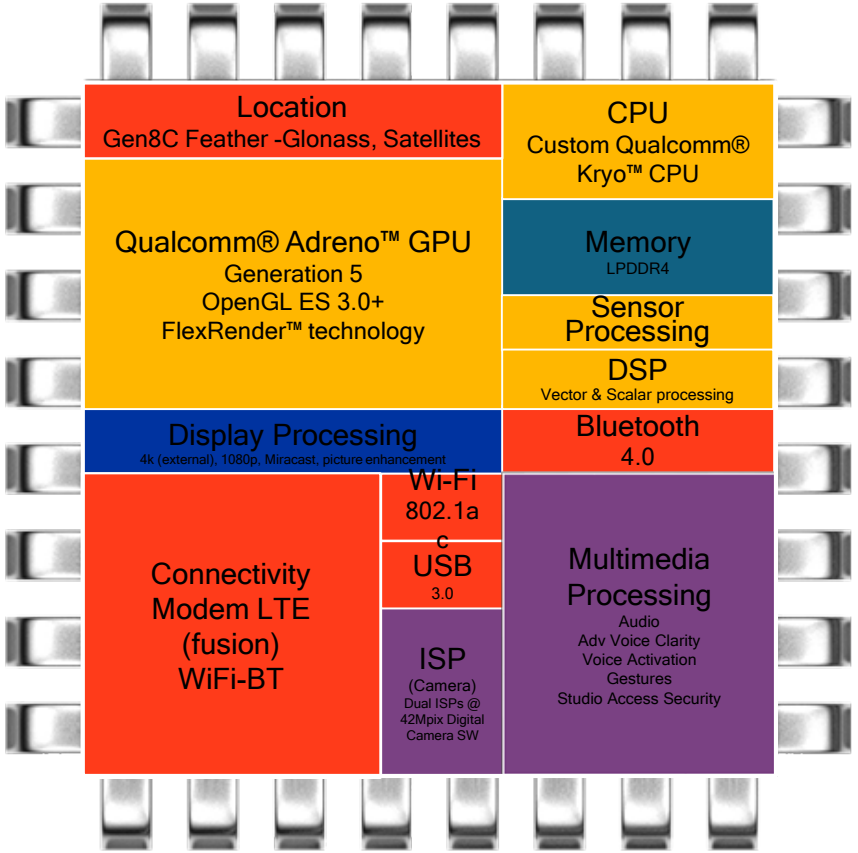
Precise Localization Fusing GPS, Visual Odometry and Vehicle Sensor Data

360º Modeling of Car Environment

Rich HMI Display

DSRC and Future LTE-Direct Safe/Secure V2X

Highest Downlink and Uplink Speeds for HD Map Data and Real-Time Cloud Sourcing



HDR Multi-Camera Interface

Robust Decisions with Sensor Fusion

Vehicle Speed, Direction, Tire Pressure

Real-Time Computer Vision

Natural Human Machine Interaction

** For automotive, modem will be non-integrated and available as a module.*

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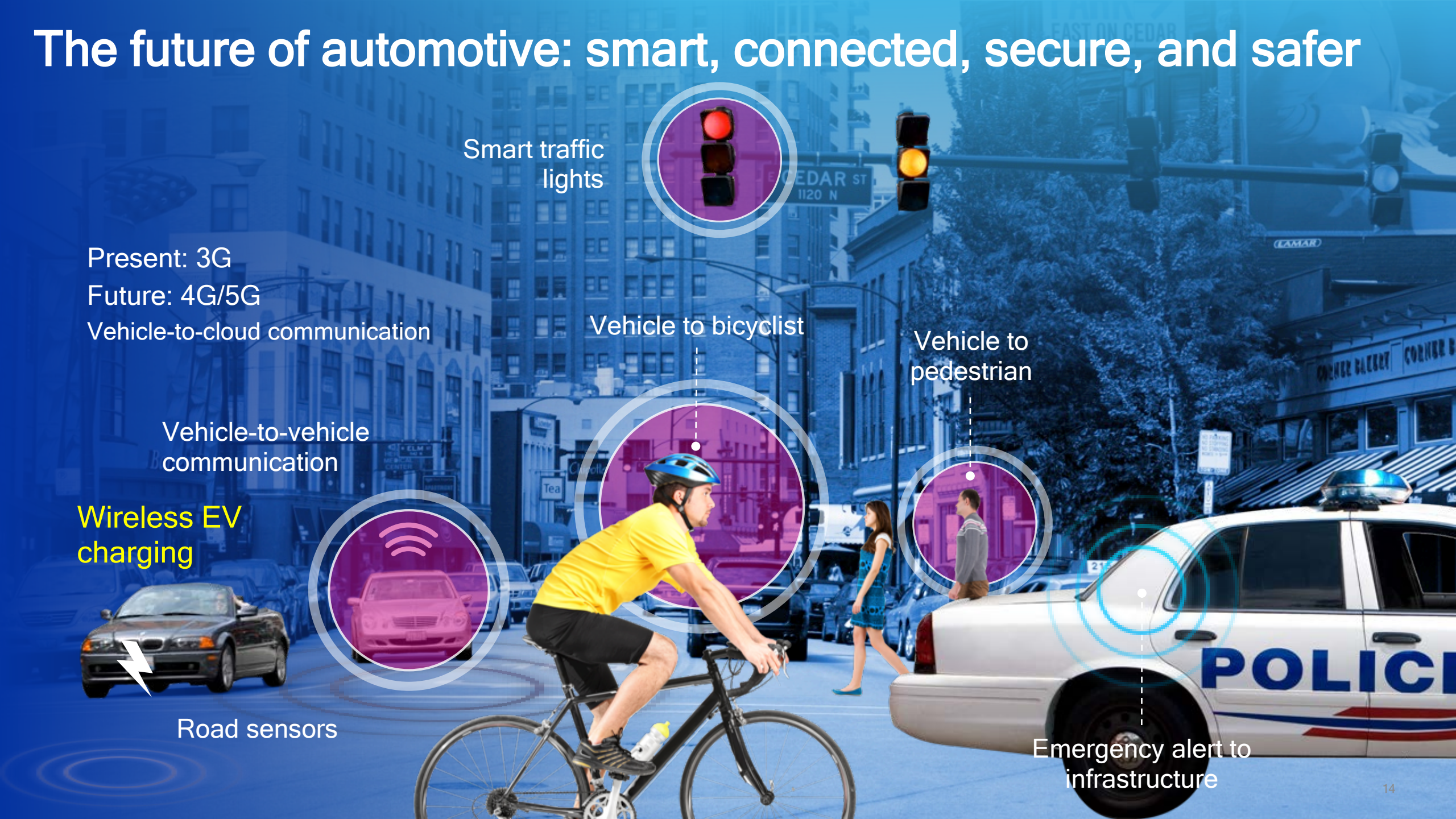
The future of automotive: smart, connected, secure, and safer



Qualcomm Halo™ Technology

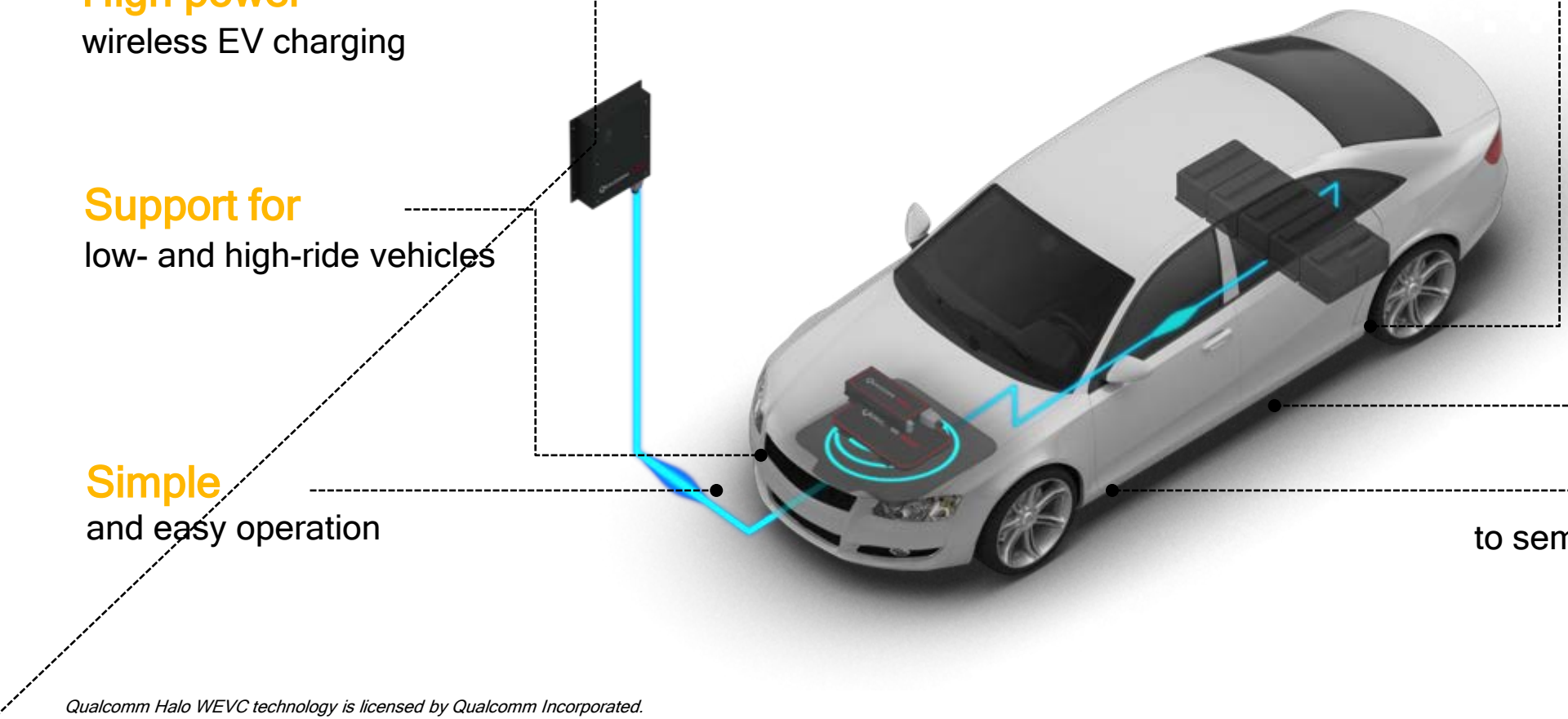
Wireless electric vehicle charging (WEVC) power options:

3.7kW, 7.4kW, 11kW & 22kW

High power
wireless EV charging

Support for
low- and high-ride vehicles

Simple
and easy operation



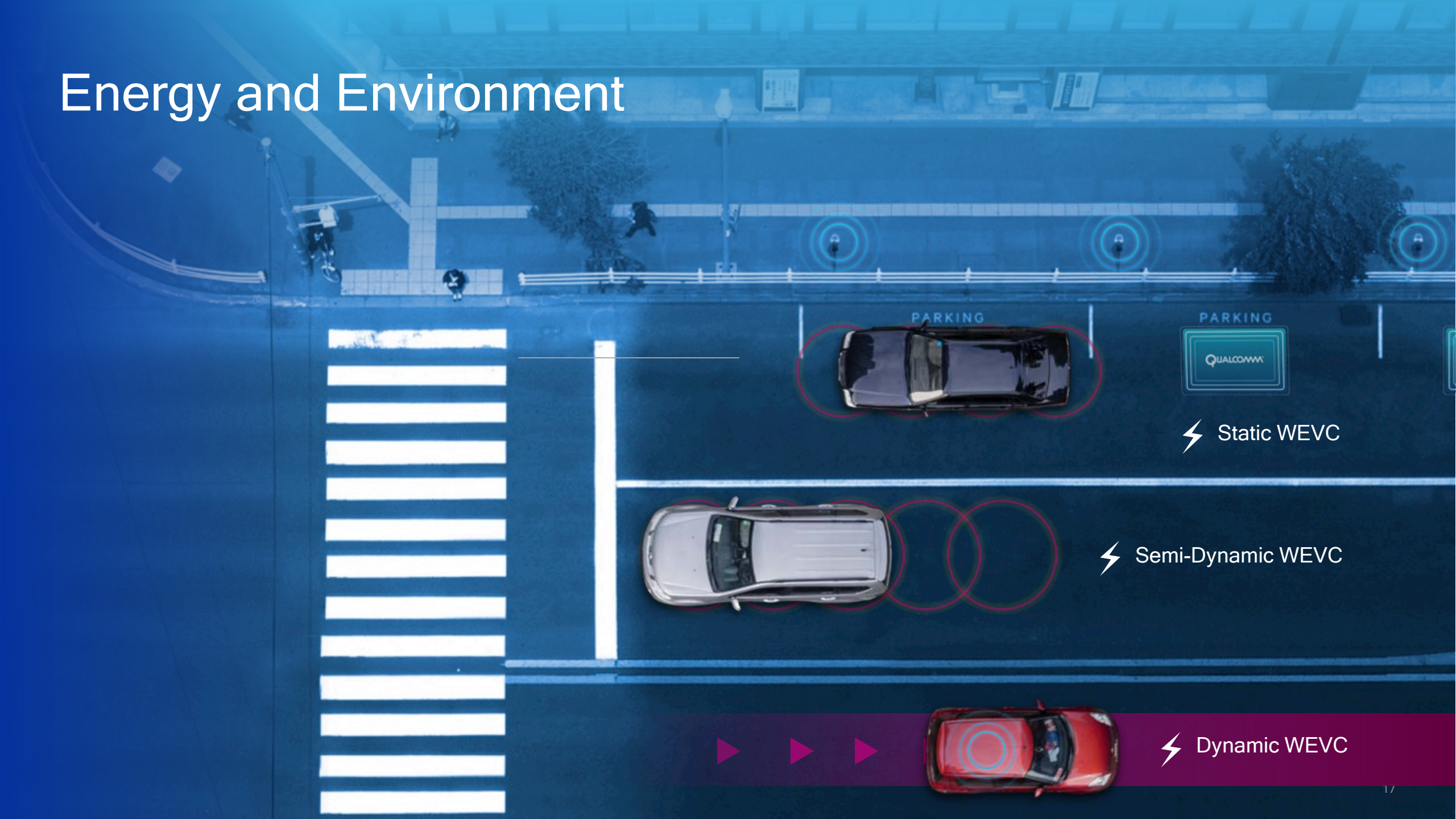
Standardized
85kHz operating frequency

Safe
with foreign object detection, EMC, RF and other safety features

Roadmap
to semi- and full-dynamic charging

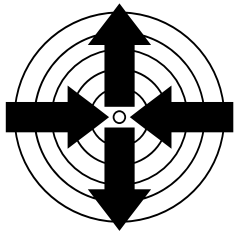
Qualcomm Halo WEVC technology is licensed by Qualcomm Incorporated.
Qualcomm Halo prototype charging pads are products of Qualcomm Technologies, Inc.

Energy and Environment



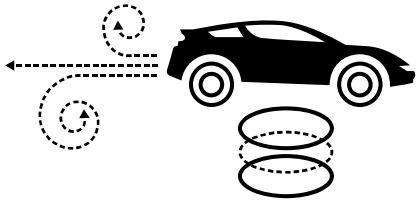
Smart Transportation

Greater safety, convenience and efficiencies for the next generation of connected vehicles



Safety

Enhance safety with dedicated short-range communications (DSRC/IST-G5) for vehicle-to-vehicle and vehicle-to-infrastructure connectivity that relays road hazards, traffic and other information



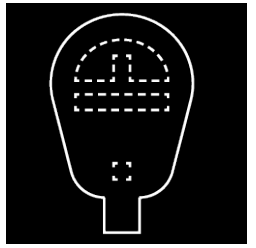
EV Charging

Make electric car charging easy and accessible with Qualcomm Halo™ Electric Vehicle Charging

Traffic

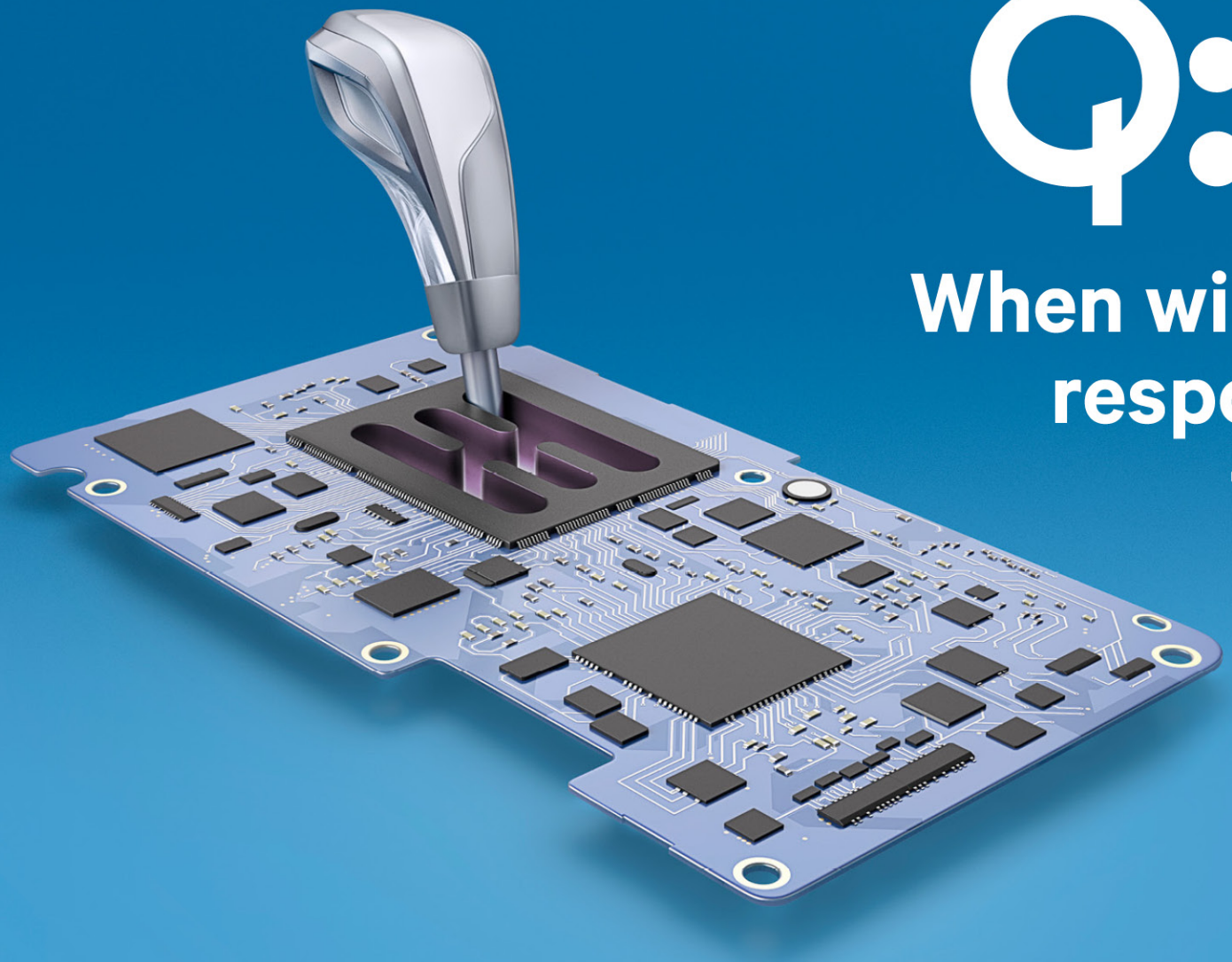
Reduce costs, congestion and CO_2 emissions with multimodal transit & traffic management.

Enable computing power at the edge of the network via smart traffic cameras or digital signage.



Parking

Monitor parking usage and space patterns to dynamically assist with traffic congestion, adjust pricing and increase revenues.



Q:

When will our cars respond to more than just the road?

Why Wait™

QUALCOMM®

Thank you

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