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Qualcomm

# First Annual 2018 National Mobility Summit of US DOT University Transportation Centers

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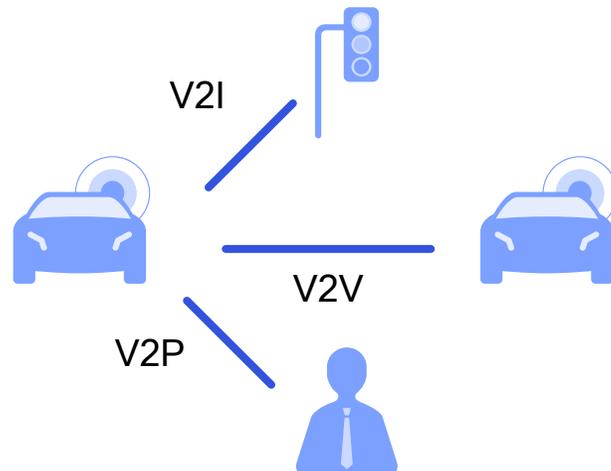
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# C-V2X defines two complementary transmission modes

## Direct communications

V2V, V2I, and V2P operating in 5.9 GHz ITS bands independent of cellular network or cellular subscription

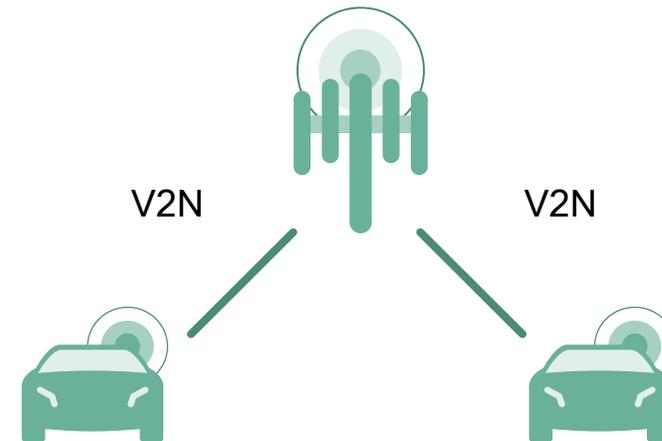


### Active safety

Latency-sensitive use cases, e.g. collision avoidance

## Network communications

V2N operating in traditional mobile broadband licensed spectrum



### Informational safety

More latency tolerant use cases, e.g. *accident 2 kilometers ahead*

## 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

- ✓ Release 14 C-V2X completed in 2017
- 5G Broad industry support – 5GAA
- 🌐 Global trials started in 2017
- 🚗 Our 1st announced C-V2X product in September, 2017

The only V2X technology with a clear and forward compatible evolution path to 5G



5G V2X will be backwards compatible with C-V2X R14

C-V2X R14 only car



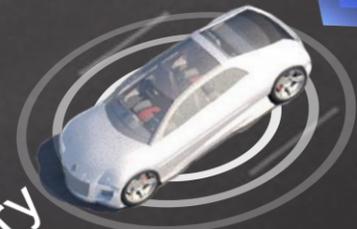
Automotive safety  
Forward-collision warning



C-V2X R14 PC5

C-V2X R14 PC5

C-V2X R14 / R16



C-V2X R14 / R16

Sensor/trajectory sharing

C-V2X R14 / R16 PC5

Autonomous driving



5G

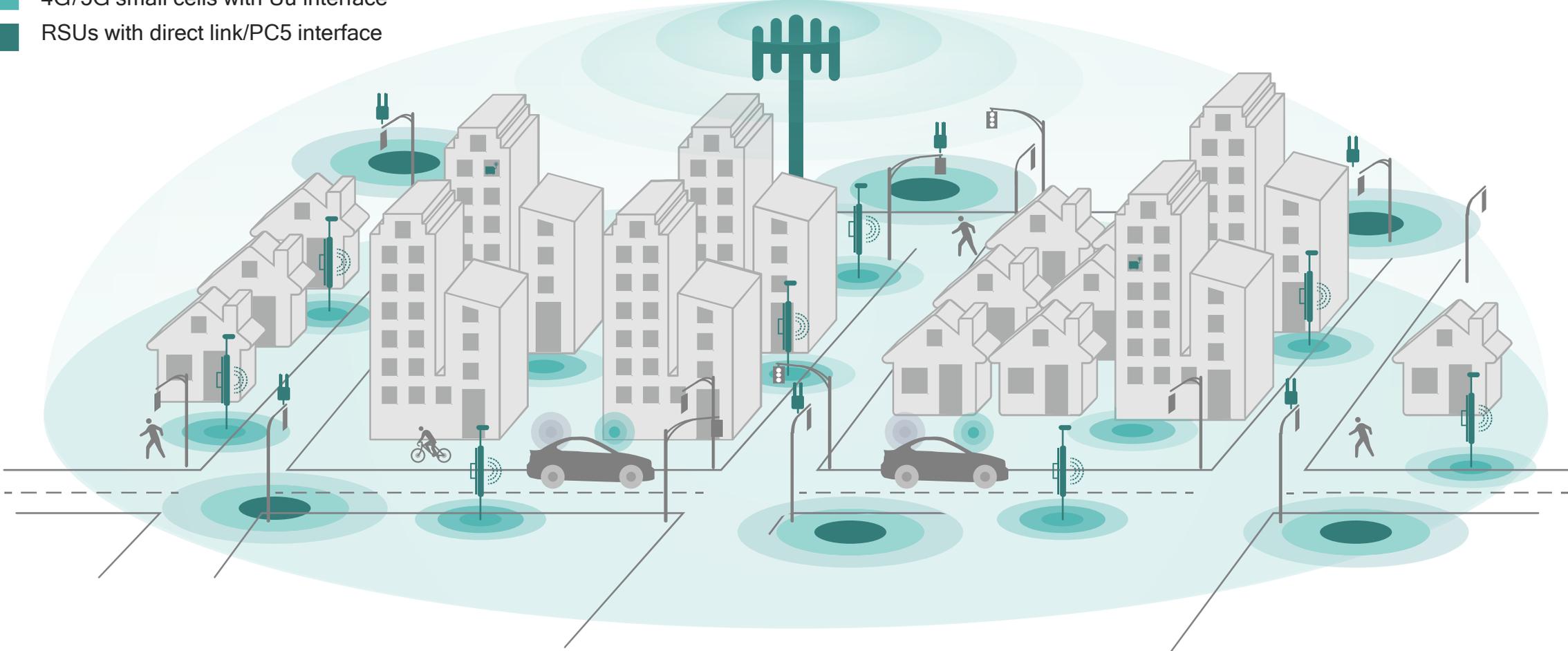


5G V2X brings about complementary capabilities for autonomous driving

# Synergy with cellular network reduces deployment cost

Opportunity for combined RSUs with 4G/5G infrastructure and its backhaul

- 4G/5G small cells with Uu interface
- RSUs with direct link/PC5 interface





# Thank you!

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