

# Verizon 5G Edge with AWS Wavelength enhances connected and autonomous experiences.

New, advanced safety and connected-vehicle use cases are now possible.

From connected vehicles using Cellular Vehicle-to-Everything (C-V2X) capabilities to make driving safer to eventual fully autonomous vehicles,<sup>1</sup> Verizon 5G Edge with Amazon Web Services (AWS) Wavelength is playing a key role in accelerating innovation in the automotive industry.

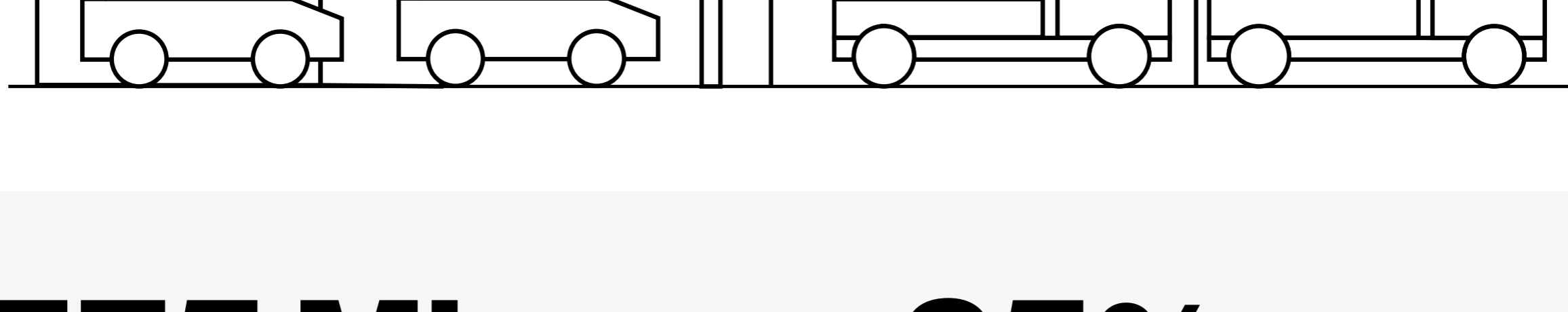
## An evolving landscape

- 1. Connected vehicles**
- 2. Autonomous driving and safety**
- 3. Sharing and subscription**

## 1. Connected vehicles

5G Edge with AWS Wavelength can enable:

- Upstream critical sensor and performance information
- Rich media and non-entertainment information during transit
- Over-the air (OTA) upgrade capabilities



**575 Mbps**      **25%**

The average 5G speed by 2023<sup>2</sup>

The automotive sector is forecast to have the most cellular IoT connections of any sector in 2025, with a projected 25% share of total cellular IoT connections worldwide.<sup>3</sup>

## 2. Autonomous driving and safety

5G Edge with AWS Wavelength can provide:

- Improved safety and convenience features with advanced driver-assistance systems
- Near real-time situational awareness with C-V2X
- Detection of bicyclists, pedestrians and other moving vehicles with artificial intelligence (AI) and mobile edge computing (MEC)



**36,120**      **94%**

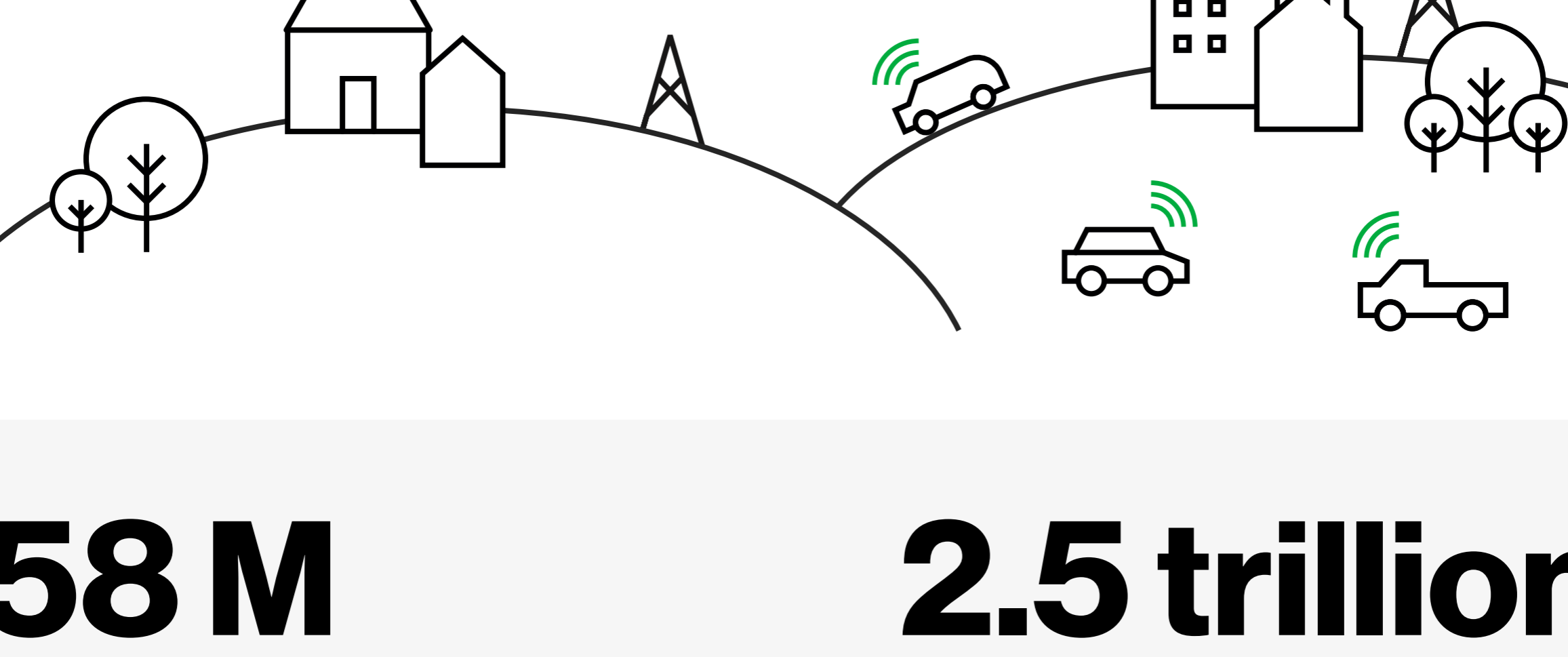
Number of traffic fatalities in the U.S. in 2019<sup>4</sup>

The portion of all vehicle crashes due to human error<sup>5</sup>

## 3. Sharing and subscription

5G Edge with AWS Wavelength can help:

- Make ride-sharing and vehicle-sharing mainstream
- Enable subscription services from auto manufacturers
- Enable mobility as a service (MaaS) using autonomous driving capabilities



**58 M**      **2.5 trillion**

The number of autonomous vehicles expected to be sold worldwide by 2030<sup>6</sup>

The potential market size for autonomous cars and "robotaxis" by 2040, largely made up of MaaS<sup>7</sup>

## How does 5G Edge with AWS Wavelength help transform connected and autonomous vehicles?

AWS Wavelength Zones bring the latest compute and storage technologies to the edge of the Verizon 5G Ultra Wideband network so that they can be accessed with low latency from connected vehicles.

Traffic between 5G devices and content or application servers hosted in Wavelength Zones does not traverse the internet, resulting in reduced variability and packet loss.

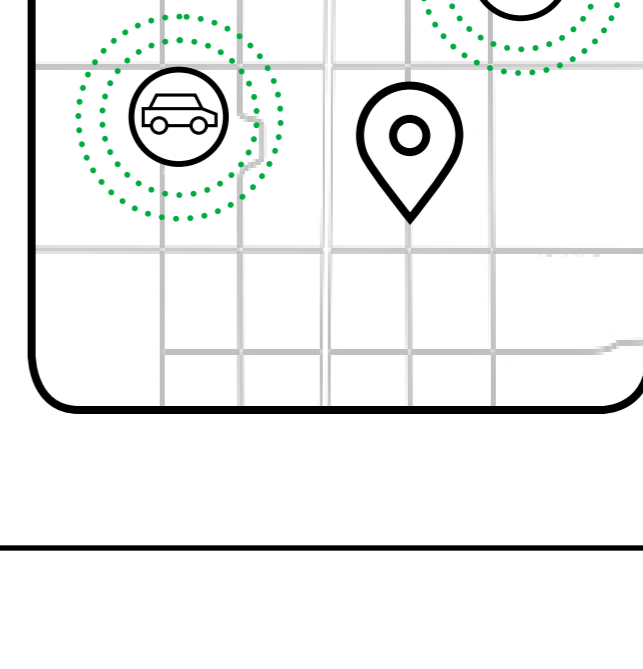
Low-latency access to 5G Edge computing infrastructure enables hosting for safety and autonomous driving assistance applications on AWS Wavelength. Low latencies can also enhance the user infotainment experience, reducing wait times and allowing for responsive interaction.

## New use cases enabled by 5G Edge with AWS Wavelength advanced safety features

- Near real-time situational awareness**  
Urgent conditions (like icy roads or mudslides) can be updated and relayed with minimal delay.
- See-through operations**  
Vehicles are able to "see" what's happening ahead on the road, even if they're blocked by large trucks.
- Pedestrian safety**  
Vulnerable road users like pedestrians or cyclists ahead can be detected via cameras, with AI inference assistance from the mobile edge.

## Infotainment

- In-car entertainment**  
Keeping popular content on the mobile edge as part of a content delivery network (CDN) to allow fast access can improve the consumer experience.
- High-definition maps**  
Tiles or other localized information can be stored at the mobile edge, reducing the time to pull high-definition content and allowing for high interactivity with rich content.

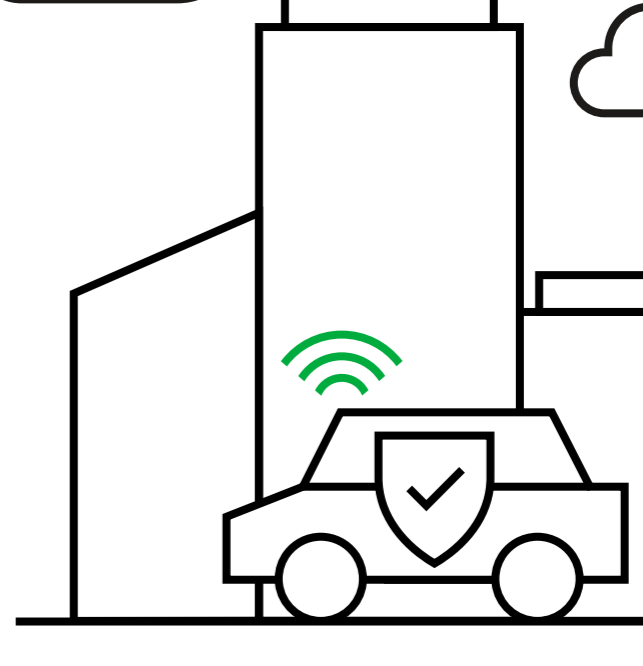


## Convenience and comfort

- Road conditions adjustment**  
Real-time updates on road conditions can help inform drivers about the best lanes to stay in and update traction control systems.
- Localized traffic analysis**  
Improved routing can help optimize traffic flow, avoiding slowdowns or traffic jams.
- Cooperative lane change**  
Vehicles can leverage MEC to signal other nearby vehicles about their lane-changing intention.

## Security

- Edge-hosted malware detection**  
Protect against denial-of-service attacks that attempt to compromise or overload the vehicle-to-everything (V2X) infrastructure experience.
- Authentication for C-V2X**  
Help ensure that only trusted entities are in communication over the network with the authentication and authorization at the mobile edge.

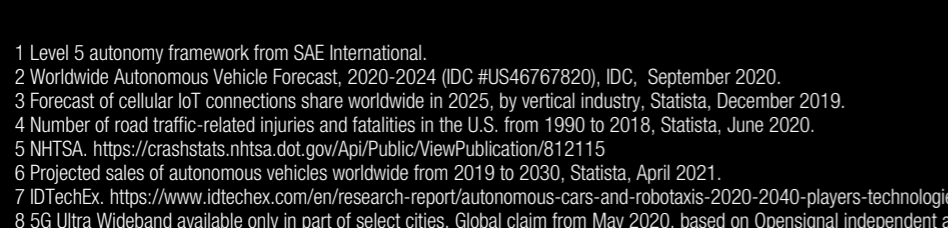


## 5G Edge with AWS Wavelength benefits for autonomous vehicles

- Reliable and consistent network connectivity**  
Improve connectivity as fewer network elements between the vehicle or mobile device and application servers reduce variability and packet loss.
- Lower latency for real-time responses**  
Enable near real-time vehicle-to-vehicle, vehicle-to-infrastructure, and other safety and autonomous driving functions.
- Innovation**  
Bring new services to market faster by using 5G Edge with AWS Wavelength to leverage the benefits of improved network performance offered by Verizon 5G Ultra Wideband, the fastest 5G in the world.<sup>8</sup> Use AI and machine learning (ML) services and graphic processing unit (GPU) acceleration to offload onboard processors. Provide richer applications without consuming more space, weight or power on the vehicles.
- Cloud elasticity**  
Scale your infrastructure up or down to meet demand or reduce costs. Seamlessly shift workloads to AWS Regions as needed. Process data at the edge to avoid backhauling vast amounts of data.
- Consistent developer experience**  
Access familiar and powerful AWS services and developer tools. Enjoy the benefits of the AWS cloud like pay-as-you-go pricing and on-demand access. Application developers can reuse their development methodology, application monitoring constructs and infrastructure.

## 5G Edge with AWS Wavelength helps bring to reality the many possibilities of autonomous and connected vehicles.

To learn more about 5G Edge with AWS Wavelength, visit [verizon.com/5gedgeawscloud](https://verizon.com/5gedgeawscloud) or [aws.amazon.com/wavelength](https://aws.amazon.com/wavelength)



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7. IOTV2X. <https://www.iotv2x.com/industry-research-report/autonomous-car-and-networks-2020>. (2019).  
8. 5G Ultra Wideband available only in part of serviceable areas. Data from Verizon, 2020. Based on operational performance analysis of mobile measurements recorded during the period January 31-April 30, 2020.  
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