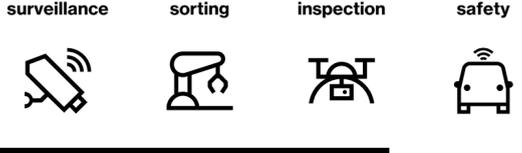


5G and the edge for computer vision and robotics

Verizon 5G Edge with AWS Wavelength enables autonomous operations everywhere

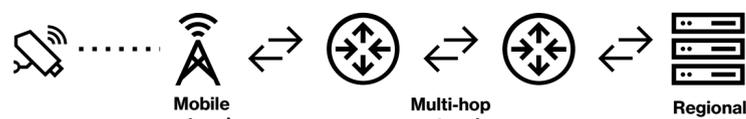
Computer vision brings sight and insight to a wide range of applications

Computer vision (CV) systems emulate human vision to help perform monotonous and time-critical tasks. Recent advances in artificial intelligence and machine learning (AI/ML), particularly in deep learning, has increased the accuracy and speed of CV, allowing it to power autonomous systems.

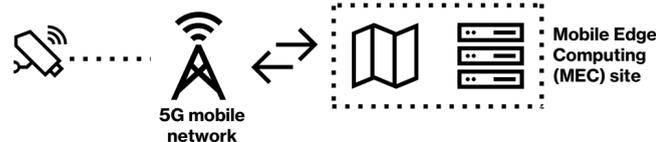


Cloud-hosted CV applications process still and video images and take action faster than humans can – detecting and sorting objects, issuing safety and security alerts and controlling robots and vehicles.

Mobile-enabled robots and video cameras leverage CV applications in the cloud to perform fast AI/ML-based image processing, but this incurs multi-hop network latencies.



5G and edge computing can reduce the latency and enable low-latency autonomous control systems powered by CV.



- Minimal network hops to MEC site provides fast access to powerful AI/ML services for accurate and rapid CV processing
- Near real-time CV processing and decisioning supports autonomous control and other low-latency use cases

5G and edge increases computer vision's reach and effectiveness

Ultra-low latency: Close proximity of edge computing to the mobile user provides the lowest possible latency between computing and video devices.

Ultra-high bandwidth: Data transfer between the edge computing resource and devices reduces potential constraints in the backhaul or core network.

Reliability: Reduced number of network hops between the devices and computing resources helps ensure a reliable connection with reduced variability.

Scalability: AWS cloud services can be scaled up or down as needed based on customer workloads. Pay-as-you-go pricing provides added financial flexibility.

Powerful computing: AWS Wavelength provides access to powerful Amazon EC2 instances equipped with GPUs for fast processing of video streams for decisioning.

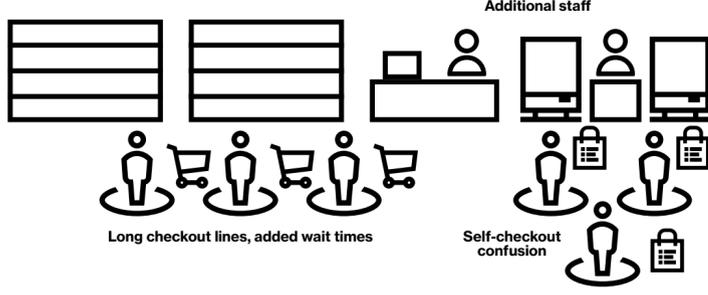
Retail cashierless checkout example

Computer vision systems support retail use cases including video surveillance to reduce shrinkage and improve health and safety compliance. CV-enabled autonomous mobile robots can stock shelves and conduct inventory checks.

CV coupled with 5G and edge can enable new cashierless systems that work well across multiple retail settings, such as convenience stores, airports and train stations, and venues such as stadiums, theaters and racetracks.

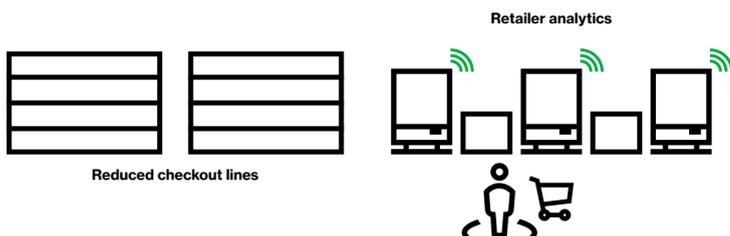
Without 5G and edge computing:

- Longer checkout times with long lines contributing to poor customer experience
- Need to recruit and train more cashiers
- Self-checkout often confuses customers and requires extra staff members to assist
- On-premises cashierless systems require expensive and sizable onsite computing footprint, staff to maintain systems, and don't support flexible deployments like pop-up stores



With 5G and edge computing:

- No checkout lines – instant checkout leads to improved customer experience
- Reduced headcount needs with cashierless system
- Reduced shrinkage due to accurate tracking of items in shopping carts
- Small onsite footprint required for computing equipment
- Detailed analytics can be used to improve stock management, product placement and increase sales



Recent field trials of a cashierless checkout system demonstrated*:

- 78% increase in transaction count**
- 80% increase in basket size**
- 50% reduction in transaction time**
- 139% revenue increase**
- 67% reduction in personnel required**

* Based on Verizon Ford Field POC trials.

CV and robotics using Verizon 5G Edge with AWS Wavelength

Explore how high-performance and reliable mobile technologies coupled with strategically-located edge computing resources can bring innovative CV-powered solutions to enterprises and consumers everywhere.

- Location:** AWS Wavelength is located with Verizon's 5G mobile core, providing the lowest latency and most reliable access to cloud computing for video processing and storage.
- Security:** Verizon 5G Edge is protected from direct internet access and relies on secure mobile identity management, providing increased security.
- Discovery:** CV applications can use Verizon Edge Discovery Service (EDS) in real-time to find the closest AWS Wavelength instance to the video or image source to reduce the latency.
- Acceleration:** Developers can use familiar AWS console, APIs and AWS services for development, with access to EC2 instances with GPU and AI acceleration for intensive image processing needed for CV.
- Processing:** Full-access to rich computing resources enables rapid processing of incoming image streams to identify, categorize and take action.
- Resiliency:** Edge-based applications can continue to process data even if upstream network connections are down, improving network resiliency and CV application availability.

Get started.

Verizon 5G Edge with AWS Wavelength delivers CV-powered solutions with a smaller onsite footprint, a lower starting cost, pay-as-you-go pricing, and comes with a large ecosystem of developer and professional services support.

Learn more

verizon.com/5gedgeawsavelength

