

5G and Edge Computing Retail Platform

White paper

Retailers can address multiple pressing business problems with a common platform solution enabled by advanced connectivity and decentralized edge computing architecture designed to accelerate digital transformation.

Physical stores (big-box and small retailers) are changing to be smaller and closer to the consumer while serving as a means for faster fulfillment. In addition to the clear human and health impacts, COVID-19 will likely have complex, lasting economic impacts and potential outcomes. To address the rapidly changing environment, retailers will need to accelerate their digital transformation to enable capabilities that support a convenient, digital 'touchless' retail experience and real-time actionable insights within their operations to be more lightweight and responsive.

Through 5G and Edge Computing, retailers will be able to change customer experience and stores' operations by integrating next-generation technologies at scale. Traditional use cases will be revolutionized with real-time product recommendations, improved data capture and analysis, enhanced customer experience using technologies such as augmented reality (AR), virtual reality (VR) and Artificial Intelligence (AI) enabled personalized marketing, and total inventory transparency. New applications will deliver allocation and replenishment decisions backed by real-time customer purchasing behavior and inventory visibility to provide uniquely personalized experiences for customers. These capabilities used at unprecedented 5G speeds will transition from a "nice to have" to an expected capability.

Why 5G?

5G has a potential to drive digital transformation across industries, by providing the foundational platform for connecting wireless devices, applications and people to enable speedy responses to events and trends. Retailers can expect more than just a fast network; they can expect to be able to connect and harvest data from a vast array of wireless devices, expand their ability to store and process that data close to the source of origin, and thereby drive growth and operational efficiencies.

5G is expected to impact nearly every dimension of retail operations such as customer experience, inventory management, physical and digital workflows and merchandising. 5G and complimentary technologies, such as edge computing, will enable customers to proactively receive customized shopping lists based on individual preferences and scan prior orders in real time. Through the use of sensors and video analytics, customers will be able to use augmented wayfinding to select the fastest route to the right aisle in the store with the products they are interested in. At the same time, store operators will be able to monitor where customers are in the store, analyze dwell-time patterns and approximate checkout wait time, and achieve real-time inventory visibility as well as adherence to planograms. Utilizing these technologies can also help retailers avoid customer-frustrating product shortages without overstocking, as well as gain real-time insights into fast-selling products and automate replenishment of these items.

Within the distribution centers these same technologies can be applied to perform quality checks on products, count inventory-units and to support occupational processes around security and safety. Layer in technologies such as AI algorithms, and it becomes possible to gain actionable insights from real-time data to track shipments, optimize schedules at warehouse docks and use temperature sensors to monitor and safeguard perishable goods, such as food and pharmaceuticals. This can lead to a reduction of waste and deliver significant financial benefits.

| Benefit | Application | Near-term opportunity | Long-term opportunity |
|--|---|---|---|
| Increased data volume | Allows use of cameralytics and other unstructured data | Cameras placed in distribution centers to keep track of inventory levels linked to an AI-backed algorithm, reducing the need for cycle counting while maintaining inventory | Cameras, through AI, pick up when produce is near spoiling and triggers a sale to ensure produce is sold at peak freshness, reducing waste |
| Real-time response times | Drives development of insights through mobile Edge Computing for real-time analytics | Real-time product catalog visibility dramatically improving inventory management | Merchandizing assortment and allocation models can be backed by real-time customer data to improve decision making |
| Ultra-fast speeds | Delivers data for real-time pricing, promotions and replenishment, and labor management | Targeted promos pushing larger basket size based on beacon and RFID technology at relevant moments in the customer journey | Faster speeds allow for real-time pricing optimization allowing retailers to use functionality such as IoT drones noticing peak traffic to trigger a discount and encourage purchasing behavior |
| More devices reliably connected | Creates Internet of Things ecosystems including cameras and smart devices | Diminishing saturation of connectivity within warehouses enable real-time location of inventory and equipment | Heterogenous network within the stores connected with consumer devices enables tracking of consumer's shopping route to optimize store layouts |
| Precise location sensing | Enables drones and robotics for product placement and tracking more accurate and detailed heatmapping | Camera identification of low stock triggers a replenishment notification to store associates | Robotics utilized to automate stocking shelves after store closures to reduce associate expenditures while maintaining track of all inventory within stores and distribution centers |

It is time to act now.

Are you planning for 5G and Edge Computing already? You should be. A survey¹ conducted in November/December of 2019 with 415 US-based IT and line-of-business (LOB) subject matter experts who are responsible for connectivity at their organizations found that:

- 57% believe their company's **current networking infrastructure prevents them from addressing innovative use cases**
- 87% believe their company can **create a significant competitive advantage** by leveraging advanced wireless
- 86% of adopters believe **advanced wireless will transform their organization** within three years – and 79% say the same about their industry
- More than 8 in 10 believe advanced wireless connectivity is “very” or “extremely important” to their **organization's ability to take full advantage of AI, edge computing, IoT, cloud, and big data analytics**

Most retailers are off 15-25% on their inventory counts and are spending a significant amount of money on extra inventory or simply losing sales. As well, retailers are losing 3-8 margin points vs. walk-in customers on new omni-channel journeys such as Click and Collect (same-day/next-day delivery), Local Delivery etc.- especially if these customer journeys have not been integrated with back-end systems and processes. Having accurate inventory counts to support Click and Collect, Local Delivery, Buy-Online and Pick-up in Store (BOPIS) as well as traditional walk-in customers is crucial. But this is just one area where 5G and edge computing can add value.

¹ Source: Deloitte Study of Advanced Wireless in the Enterprise about their industry

A platform to drive innovation.

Verizon, SAP and Deloitte are partnering to bring to you the power of Verizon Intelligent Networks, integrated with SAP's comprehensive portfolio for the Intelligent Enterprise and leveraging Deloitte deep expertise in retail analytics and business transformation.

We have co-innovated on a platform solution that leverages 5G and Edge Computing architecture that supports multiple use cases that address business challenges, such as:

- Out of stock avoidance, overstock pricing
- Planogram compliance
- Shrinkage control
- People counting, social distancing
- Dynamic pricing in real time based on store inventory and customer preference
- Digital signage that updates as customer walks by
- Workforce management

In a traditional approach, these business problems are addressed in a siloed way that typically involves deploying new solutions for each additional problem being addressed. This impacts speed of delivery, cost of implementation and ability of operations teams to learn new technologies. In contrast, this architecture supports initial deployment to meet your most pressing business problems and deliver measurable ROI, while providing the ability to scale across the enterprise.

The solution targeted for stores or distribution centers has been proven out with the deployment of a Minimum Viable Product (MVP) that relies on a cohesive architecture. This MVP was built to show two use cases leveraging our common platform: Out of Stock Replenishment and Planogram Compliance.

Our 5G/Edge Computing Retail platform consists of an access network, edge infrastructure and applications with integration to back office enterprise applications. Key Components include:

- Access Network - wireless network on site connecting cameras and sensors
- Edge Infrastructure - edge compute infrastructure, computer vision inference stack, computer vision applications, machine learning models, edge workflows (store and distribution centers)
- Back office – cloud connectivity, enterprise applications integration, workflows (end-to-end business process automation)

Our approach allows you to use your existing networks, such as Wi-Fi, but also provide a pathway to adopt more advanced 5G networks and unlock the benefits of increased scalability of adding devices, speed, reliability and support for advanced imaging applications. With the ability to seamlessly connect IoT devices (i.e. cameras and sensors) data can be captured, transmitted, stored and processed in near real-time.

With a curated set of ecosystem partners for devices, sensors, device lifecycle management, system engineering and implementation, we can extend use of the same platform to deploy a diverse set of industry-specific use cases.

What powers our platform.

Verizon's 5G consists of a millimeter wave based ultrawideband (UWB) and sub-3GHz nationwide service that's capable of reaching more than 200 million people across 1,800 cities and towns today. The 5G UWB service is capable (under optimum conditions and compared with LTE), of supporting a 10X decrease on latency, 10X more device connection density and 10X more experienced average throughput per user. Additionally, 5G can be used as a unifying framework to take advantage of other connectivity technologies (Wi-Fi, MPLS/WAN etc.) already being used within Retail environments today.

Verizon is also developing both public and private Mobile Edge Compute (MEC) offerings integrated with 5G network that leverage cloud offerings from partners to address the needs of customers. Verizon 5G Edge Public MEC enables high performance and lower latency by placing the cloud compute closer to the customer at the metro edge, with a converged 5G wireless network direct connection. Verizon 5G Edge Private MEC will deploy a dedicated onsite compute paired with an onsite private LTE/5G network when ultra-low latency is required. Verizon is developing these solutions in close collaboration with partner cloud service providers and has announced partnerships with Amazon Web Services (AWS) and Microsoft.

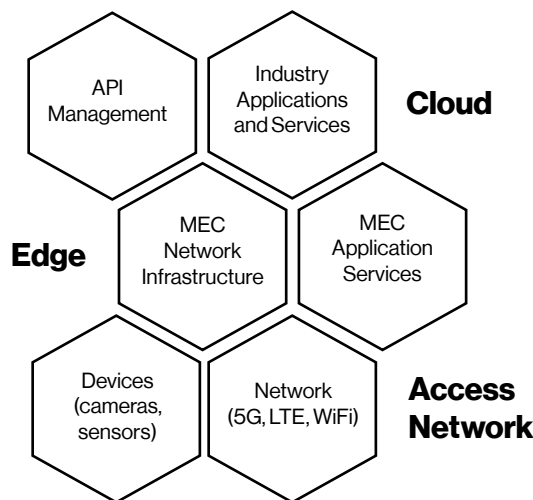
Mobile Edge Computing (MEC) is one of the four key elements – along with massive fiber resources, small cell deployment and critical millimeter-wave (mmWave) and sub-3GHz spectrum holdings – that help make the Verizon 5G network a powerful tool for transformation. Customers can greatly benefit from the resultant increases in wide area coverage, speed, bandwidth, throughput, reliability, agility, scalability, energy efficiency, privacy and security that these two technologies can deliver.

SAP S/4HANA is a future-ready ERP system with built-in intelligent technologies, including AI, machine learning, and advanced analytics. It transforms business processes with intelligent automation and runs on SAP HANA® – a market-leading in-memory database that offers real-time processing speeds and a dramatically simplified data model.

SAP Consumer Sales Intelligence is a cloud solution that lets you collect and access point-of-sale transactions and inventory data – all in one place, from anywhere, and in real time. With the solution, you can create delightful user experiences across digital touch points, streamline the design and development of interfaces, and increase collaboration and mobile connectivity.

SAP Customer Activity Repository (CAR) is a foundational element of the SAP retail solution. It is an on-premise solution that includes the ability to consolidate transactions from any channel and enable real time inventory availability in all locations (stores, distribution centers and even suppliers). SAP CAR also serves as the foundation for the retail planning suite and includes a robust forecasting engine based on advanced Machine learning technologies.

Intelligent enterprises strike the balance between optimizing their current business models and innovating at the vertical edge to develop new revenue streams and growth potential using digital technologies. SAP and its partners are offering industry cloud solutions that extend the end-to-end processes of SAP's intelligent suite to help drive customers' core business in their industries.



Conclusion.

We can work with you to evaluate how best to leverage your existing technology investments and select a starting point for transformation– based on the business problems that may need to be addressed immediately and your digital transformation goals and roadmap.

With our digital platform, retailers gain significant efficiencies in their operations and transform customer experience by unlocking the potential of emerging technologies (such as AI, AR/VR and computer vision) enabled by 5G and edge computing technologies.

Learn more.

To learn more about 5G/Edge Computing for Retail, contact your account representative.

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SAP: SAP's strategy is to help every business run as an intelligent enterprise. As a market leader in enterprise application software, we help companies of all sizes and in all industries run at their best: 77% of the world's transaction revenue touches an SAP system. Our machine learning, Internet of Things (IoT) and advanced analytics technologies help turn customers' businesses into intelligent enterprises. SAP helps give people and organizations deep business insight and fosters collaboration that helps them stay ahead of their competition. We simplify technology for companies so they can consume our software the way they want – without disruption. Our end-to-end suite of applications and services enables business and public customers across 25 industries globally to operate profitably, adapt continuously and make a difference. With a global network of customers, partners, employees and thought leaders, SAP helps the world run better and improve people's lives. For more information, visit www.sap.com.

Verizon: Verizon has expertise in building, maintaining and operating networks and remotely managing hundreds of millions of devices. We invest billions of dollars every year so that our networks are resilient and future ready. And, just as critically, we understand digital transformation and have the experience and expertise to help organizations evolve and advance. It's why 97% of the Fortune 500 count on us to help their enterprises thrive. Now, Verizon 5G Ultra Wideband is paving the way for a new era of business innovations with ultrafast speeds with ultralow latency.

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