

With increased speeds, reduced latency, and the ability to support more connections, 5G serves as an innovation platform, enabling next-generation retailers to leverage the benefits of Internet of Things (IoT) and real-time data analytics to enhance customer experience and empower employees.

5G in Retail: Increasing Customer Engagement and Reducing Labor Costs Across the Omni-Channel, Connected Store

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Introduction

The arrival of COVID-19 precipitated not only a global pandemic but a worldwide reckoning for organizations regarding digital transformation (DX) journeys. The pace of change for digital transformation was accelerated with the need for physical storefronts to transform and shift priorities to become digital fulfillment centers. According to IDC's *FutureScape: Worldwide Retail 2021 Predictions*, "The next decade (2020–2030) will be the decade that physical retail spaces are transformed into connected and experiential fulfillment hubs where every physical action (of people, transportation, or goods) leaves a digital signature that can be harvested to drive exceptional customer service and asset productivity (stores, warehouses, trucks, inventory, and employees)."

Retailers are embracing the Internet of Things (IoT) as a key component to business strategies to build ecosystems to support the insights everywhere facets of the store of the future. Real-time insight into inventory includes arming appropriate employees with information to optimize in-stock items, identify and locate missing or mislabeled stock, and streamline fulfillment. The fluid availability of accurate and timely inventory information optimizes service on the store floor for delivery or for curbside pickup options and facilitates faster checkouts and returns. If items are restocked at any point during a shift, employees are aware and can reroute the item back onto the virtual or physical shelves quickly and efficiently, without missing a sale or frustrating customers who are engaging with stores and brands across multiple channels.

AT A GLANCE

KEY STATS

According to IDC's *COVID-19 Impact on IT Spending Survey* (December 2020), 46.9% of retailers plan to invest more in 5G products in 2021. The top objectives for retailers' 5G investments will be to enable new capabilities for the organization (56.6%) and to enable new capabilities for customers (43.4%).

WHAT'S IMPORTANT

5G will provide a platform that delivers faster speeds, lower latency, and more connections. When combined with other technologies (artificial intelligence, edge compute, augmented reality, data analytics) in new use cases, 5G will help enable an enhanced customer experience, increased employee productivity, more accurate replenishment, and omni-fulfillment by delivering faster speeds, low latency, and high connection density to power systems that will drive those use cases.

Creating a network of smart devices within the store infrastructure — including IoT devices, beacons, smart shelves, products, customer mobile devices, and self-serve kiosks/tablets — will inform insight-driven decision processes and recommended actions and interactions. IoT strategies are driving investment in 5G because of its ability to carry data traffic from a much greater density of devices. While the benefits 5G offers include speed, low latency, and reliability, the trait with the most utility for retailers is 5G's connectivity of upward of 1,000,000 devices/sq km, with considerably higher reliability. Retail investments in 5G are largely focused on the ability to bolster connectivity that will be needed to support the connected store and meet the demands of changing market conditions and customer preferences that require digital interactions across a multitude of devices.

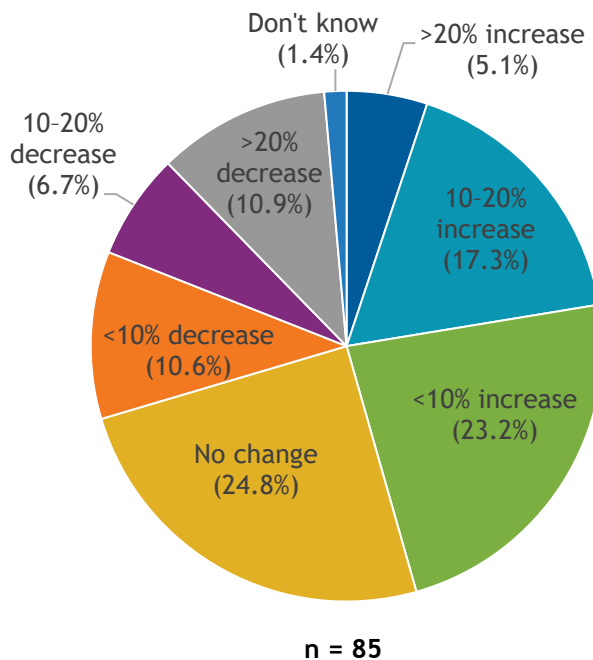
Network efficiency concerns have driven retailers to invest in edge computing. With a growing number of IoT devices to support, connectivity is imperative, and organizations are looking to reduce the distance that critical data must travel. According to IDC's *2020 Industry IT and Communications Survey*, the top objectives for edge infrastructure investments for retailers are to support new products/services (27.7%) and to build greater storage capabilities (22.5%). 5G paired with multiaccess edge compute (MEC) provides retailers with an effective method to connect an ever-expanding portfolio of IoT devices and leverage lower latency for more real-time insights and automation of operations. In addition, MEC, particularly when used in an on-premises deployment, can limit exposure of sensitive corporate or customer data, which in turn reduces risk and improves operation.

Unsurprisingly, 5G is seen as a driver of the next phase of DX for worldwide retailers. According to IDC's *Global Retail Innovation Survey* (June 2020), 26.8% of retailers are implementing or have already implemented 5G in 2021 and 62.8% of retailers plan to implement 5G within two years. In addition, 28.2% of retailers acknowledge that their boards of directors are focused on adapting new approaches to connectivity, including 5G, to achieve strategic goals, stay competitive, and/or exploit changing market conditions in the next three years.

IDC's *Future Enterprise Resiliency and Spending Survey* (Wave 2, February 2021) found that more than 45% of global retail and wholesale companies have increased 2021 budgets to address areas for 4G, 5G, and other cellular connectivity services. Additionally, more than 20% anticipate adding to connectivity budgets by more than 10% over 2020 investment levels (see Figure 1).

FIGURE 1: *Retailer and Wholesaler Spending on 4G/5G Wireless/Cellular Connectivity Services (2021 Versus 2020)*

Q Compared with your organization's actual spending in 2020 (after COVID-related adjustments), how will your organization's planned spending (budget) on 4G/5G wireless/cellular connectivity services (including hotspots) change for 2021?



Source: IDC's Future Enterprise Resiliency and Spending Survey, February 2021

Industry Definitions

Internet of Things: IDC defines the Internet of Things as a network of uniquely identifiable endpoints, or "things," that autonomously connect bidirectionally using IP connectivity.

Omni-channel retailing: Omni-channel refers to the ability of retailers to offer end-to-end service across channels (in-store, online, web-based or mobile app, etc.) including seamless purchase, pickup, delivery, and returns.

Connected store: Connected store operations maximize integrated, intelligent systems to enable automated, seamless, secure customer service and operations while maximizing the productivity of all assets (people, stores, warehouses, trucks, and inventory). The connected store of the future is built on an ecosystem of digitally connected assets, devices, integrated systems, and IoT sensors with ubiquitous connectivity across the store and its customers.

Multiaccess edge compute: Also referred to as mobile edge compute or simply edge compute, MEC refers to the ability to shift the processing out of the core network and closer to the point of data origin. MEC resources, both hardware and software, can reside anywhere from a colocation or cloud edge datacenter to the company premises to the end device itself. Shifting compute closer to the origin results in lower latency and an improved ability to secure data by limiting its path beyond the organization.

Private cellular network: Private cellular networks are any 3GPP-based LTE and/or 5G networks deployed for a specific enterprise/industry customer that provides dedicated access. It includes networks that may utilize dedicated (licensed, unlicensed, or shared) spectrum, dedicated infrastructure, and private devices embedded with unique SIM identifiers. The private LTE/5G networks are location specific and carry traffic native to a specific organization, with no shared resources in use by any third-party entities. Private cellular networks are often used in zero trust environments and for enabling business critical operations where the tolerance for network outage/interference is extremely limited and the functionality can be isolated from other internal networks and/or the public network.

Note: 5G is the fifth generation of cellular network technology currently being rolled out in the United States and many parts of the world. It is designed to deliver faster speeds, eventually lower latency, and greater connection density that will enhance traditional mobile phone service and enable new services when combined with other technologies such as augmented reality, robotics, data and video analytics, precise location monitoring, and artificial intelligence.

Key Business Priorities: Innovation Paves Path to Profit

Digital transformation has proven key to the resiliency of organizations throughout the pandemic, and within five years, the majority (95.8%) of retailers have or expect to have 5G as a linchpin to DX strategies, according to IDC's *Industry IT and Communications Survey* (July 2020). This aligns with increased spending, as data from IDC's *COVID-19 Impact on IT Spending Survey* (December 2020) reveals that 46.9% of retailers plan to invest more in 5G products in 2021. The top objectives for retailers' 5G investments will be to enable new capabilities for the organization (56.6%) and to enable new capabilities for customers (43.4%).

5G-Enabled Capabilities to Build Smart Stores: Near Term

- » **Energy and facilities management.** When 5G is combined with IoT (connected energy/environmental controls), artificial intelligence (AI)-enabled analytics, and cloud and edge computing, it provides a platform that can help retailers achieve energy-efficiency and sustainability goals. Collecting environmental data from across the retail environment through connected devices from one location will reduce labor time and costs while preventing or mitigating issues.
- » **Safety.** Connected devices will play a role in facilitating a broad spectrum of safety considerations. The physical safety of consumers and store associates is a premiere concern for retailers. In the near term, smart stores leverage data from the store from sensors and cellular connectivity to identify hazards and send alerts to the appropriate parties. Concerns of violent situations in the workplace are increasing demand for alerting capabilities, and retailers need to provide employees with location-aware, wearable safety alert systems to enable employees to alert staff and the authorities about threatening situations. In the longer term, safety strategies can be enhanced with the use of facial recognition and behavior analysis using machine learning and artificial intelligence, which can also aid in loss prevention. Safe return-to-work plans will be facilitated by technologies and organizations' networks for activities such as monitoring temperature and aiding in contact tracing for store and warehouse employees as well as consumers.

- » **Endless aisle.** The ability to understand and better serve customers everywhere in the retail environment will require strong and reliable connectivity. Capabilities inherent in endless aisle include the ability to search for and locate available or replacement inventory throughout the store as well as to make a sale on a mobile device from any location without having to go to a physical terminal or leave a customer.

5G-Enabled Capabilities to Build Smart Stores: Midterm to Long Term

- » **Smart dressing rooms.** Mirrors enabled with augmented reality will enable product recognition, searches, price comparisons, and promotional displays of related items, helping upsell and enhance customer experience. Bringing augmented reality into physical locations will require higher bandwidth, which 5G offers. However, use cases leveraging augmented reality and virtual reality will require other technologies beyond 5G, such as RFID tags or video analytics to identify products, and need to sync with other enterprise systems, such as inventory.
- » **Connected fulfillment.** Smart shelves help capture lost sales, reduce customer frustration, and build appropriate promotions with data gathered from the system by notifying store associates when merchandise is low or needs to be restocked. Connected lockers enable efficient 24 x 7 pickup, returns, and purchase. Self-service lockers can help remove friction from BOPIS and curbside delivery of products or food by offering customers another avenue for self-fulfillment. Hot and cold lockers offer temperature-controlled environments to facilitate food service options. Enhanced features, such as geofencing, accelerate fulfillment processes, reduce the number of customers in store, and reduce operational costs. These solutions will require an ecosystem of integrated, smart technologies and connectivity.
- » **Automation.** Drones and robotics to automate fulfillment can be enabled by 5G connectivity indoors and outside stores. Automating processes makes it possible for multiple customer orders to be gathered at one time, increasing productivity.
- » **Digital signage.** Adaptive digital signage will foster stronger customer recognition and tailored shopping experiences with personalized messages, custom coupons, and so forth. Responsive smart signage can also empower employees on the sales floor by giving associates access to guest information to better provide service in the moment with real-time inventory information or customized offers. Smart signage can also provide data back to operations such as traffic flow with heatmapping and customer activity including dwell time and actions taken based on marketing messages. Analytics from digital signage will drive ROI by providing insight into how to improve messaging or store layouts.

Building an End-to-End Digitally Enabled Retail Ecosystem Drives Need for Robust, Reliable Connectivity

The pandemic forced retail organizations to adapt to digital transformation at an accelerated rate, laying bare areas where digitalization had outpaced digitization and was resulting in subpar, less-than-effective service and creating challenges to effectively execute on business objectives. 5G technology can support organizations grappling with systemic challenges in new, innovative ways that were not possible without expanded, fast, and reliable connectivity.

Changing Customer Habits

As a result of the pandemic, consumers want to spend less time in stores, making in-person browsing unacceptable in the current environment. More consumers are turning to technology to deliver convenient, contactless service. IDC's *Consumer Experiences Survey* (September 2020) shows that shoppers either used for the first time or increased use of mobile apps (53%), mobile ordering (48%), mobile payment (42.6%), kiosks (41.6%), video (45%), QR codes (32.3%), voice ordering (26.8%), facial recognition (25.2%), and robotic delivery (20.7%).

Continued consumer preference for online ordering, delivery, BOPIS, and curbside pickup options will necessitate in-store experiences that offer equally fluid experiences, enabled by digital, self-service touch points for guests to check out or request product information. This also requires digital solutions to empower employees to facilitate those experiences as well as self-checkout/service options for customers to speed service and throughput for customers while solving for labor challenges.

Applying Intelligent Platforms

IDC believes that the benefits that come from connected store models will include a decrease in operational costs; an increase in inventory turns and customer satisfaction by allowing consumers to get the products they want in the manner they prefer — ultimately increasing loyalty and frequency; and an improvement in revenue and profitability. To unlock the benefits of omni-channel, connected store environments, retailers will require accessible data analytics for staff to see trends, react in real time, and have insight to inventory, customer patterns, preferences and buying habits; teams will also need data analytics to make decisions to change engagement strategies. Hyper-personalization requires architecture to arm staff with visibility to recognize customers where they are in real time. Stores can leverage technology to recognize guests based on the IP address of a phone, enabling identification of repeat customers and determining length of time spent in stores plus whether dwell time translated to a purchase. This insight into traffic and capacity is key for retailers as they evaluate the value of and potential for current and future stores.

Consistent Connectivity

There is a tremendous need for robust and reliable connectivity. To date, wireless connectivity options (LTE, Wi-Fi, LPWAN) have been provided on a "best effort" basis, with performance subject to wide swings based on network demands and competing connections. Think about accessing content in the middle of a jam-packed sports stadium. The sheer number of connections in a finite space results in severely reduced performance. 5G, as it matures, will allow mobile operators or companies using private cellular networks to provide a service-level agreement with guaranteed performance metrics. As retailers and others seek to enable greater reliance on automation, the promised network performance requirements become increasingly critical.

Considerations

Managing Hybrid Connectivity

The reality is that most retailers have established investments in connectivity — wired, Wi-Fi, or cellular. Replacing all existing connectivity with 5G would be cost prohibitive, not to mention operationally disruptive. Ditto for historical IoT and cellular investments. Additionally, not every use for connectivity in the retail organization requires or benefits from 5G's specific performance attributes, further muting a full-on replacement of all other connectivity. The trick to successfully deploying 5G in retail is to tactically target use cases that will experience a material gain from 5G and then ensure that those use cases can be strategically integrated into existing networks/dashboards and decision-making tools.

Driving ROI Back to Retailers

Retailers are focused on driving profit through their innovation strategies. That entails considering how technology spending can be allocated from a capex/opex and amortization perspective and, wherever possible, transforming a technology investment into a profit center. Working back from immediate challenges, retailers are looking for IT investments to solve issues that are standing in the way of profit. Increasing operational efficiencies and driving guest engagement/experiences are areas that will need to be addressed and will require low-latency, high-speed solutions.

Getting buy-in for unproven technologies is more difficult; however, 5G's ability to support a multitude of next-generation resources will translate to long-term benefits for retailers that make network upgrades rather than wait for even more proven, effective use cases to emerge. Retailers with long-term vision will approach 5G investment as a foundation for future-ready technologies and tactical strategies including IoT.

Securing Work from Anywhere

When asked about their organization's biggest concern about supporting work at home/remote working, 23.7% of retailer respondents to IDC's *COVID-19 Impact on IT Spending Survey* (Wave 2, April 2020) cited privacy and security as a top concern. Enabling work from anywhere does incur security risks as management and frontline employees may try to gain access to company devices and systems from potentially unsecure devices or networks. Additionally, as IoT connections diversify and proliferate throughout the retail organization, deploying security at the endpoint becomes technologically and economically impractical. The use of more robust 5G network features, such as network slicing, can support a higher degree of security at the network level.

Concerns about security can result in disjointed access or less efficient processes. Ideally, retailers will want employees to be able to collaborate effectively and have access to the appropriate resources. But employees accessing shared broadband services can open organizations to security risks. With 5G, retailers can deploy dedicated broadband connections to employees that are only for business with content and policy controls.

Not All 5G Is the Same or Is Ready Today

Through much of this document, 5G is discussed as a singular technology, but the reality is there are different variations of 5G, largely defined by the spectrum used to deploy the 5G signal. The fastest type of 5G is deployed on a high-frequency spectrum referred to as millimeter wave (mmWave). It delivers the 1Gbps speeds that make headlines. But this type of 5G comes with some significant limitations — it doesn't cover a great distance or travel through walls, trees, or other physical objects. A customer passing between the radio transmitter and the endpoint can disrupt the signal. Another type of 5G uses low-band spectrum that offers coverage similar to 4G cellular service, but it is only a step improvement in terms of speed. The final iteration of 5G uses something called midband spectrum, which blends coverage and performance. Despite the appeal of midband spectrum, in the United States, only one mobile operator has deployed it to date. Others recently gained access to midband spectrum via an FCC auction process but won't be able to start deploying it until the end of 2021 at the earliest. Additionally, advancements in 5G's ultra-low latency and connection density features are still evolving and are not currently available commercially. Yet these evolving trends shouldn't stop retailers from exploring and investing today in use cases that hinge on those features. Ultimately, retailers looking to utilize 5G need a firm understanding of *all* the performance requirements of their proposed 5G use cases (speed, latency, and connection density) and have a realistic perspective on when they might be available to the organization.

Conclusion

Ultimately, it is best for retailers to frame 5G as a journey rather than a destination. When combined with other technologies and business processes in the retail organization, 5G will become a force multiplier, with its improved bandwidth, lower latency, and greater connection density driving new efficiency gains and an improved customer experience. But 5G still has some maturing to do, both on its own and in its ability to impact retail operations. Deploying 5G successfully in retail requires an approach that is both tactical and strategic as most retailers will operate in a hybrid connectivity environment for the foreseeable future.

The best approach is to consider 5G in methodical stages, beginning first with base connectivity. Such an approach can be implemented by using the public 5G network for customer relationship building, 5G wireless broadband to provide greater flexibility and manage overall connectivity costs, or private 5G networks that can provide secure, customized management of organizational and customer data. As the 5G use cases for retail mature, both in functionality and in cost profile, retail organizations that lay the foundation for 5G connectivity today will accelerate the digital transformation of their operations and enhance customer engagement, both of which are critical for enabling future growth and resiliency.

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