

Wireless technology, including private 5G networks, MEC, and cellular IoT connectivity, are tools that retailers can leverage to gain advantages over their competitors and improve customer experience. Managed services offer a cost-effective and unintrusive way for retailers to take advantage of available wireless solutions.

Private 5G Networks and IoT Help Retailers React to Market Shifts

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Introduction

Retailers have faced an avalanche of change in the past few years, from economic shifts caused by the COVID-19 pandemic to revolutionary technologies now available to help digitize the customer experience. In the current difficult economic environment, retailers are evaluating every element of their businesses.

While digital commerce experienced significant double-digit growth during the pandemic, retail businesses are the focal point of innovation, as blended digital and physical engagement for store associates and customers becomes a top priority.

The most successful retailers are implementing wireless technology solutions to help solve many of their biggest challenges.

Private 5G Networks and Edge Compute

Retailers need to secure and capitalize on the data generated from their operations. Purpose-built private 5G networks provide dedicated connectivity for their businesses. The networks offer several advantages compared with other connectivity solutions, including network flexibility, control, and security that many retailers require. They also are more robust than Wi-Fi networks, allowing a retail location to control its data and other critical features such as security and coverage. For retailers that lack the resources to build and manage a private network, working with a telco that has advanced 5G infrastructure can provide the ability to leverage the advantages of 5G without the cost of private infrastructure.

AT A GLANCE

KEY TAKEAWAYS

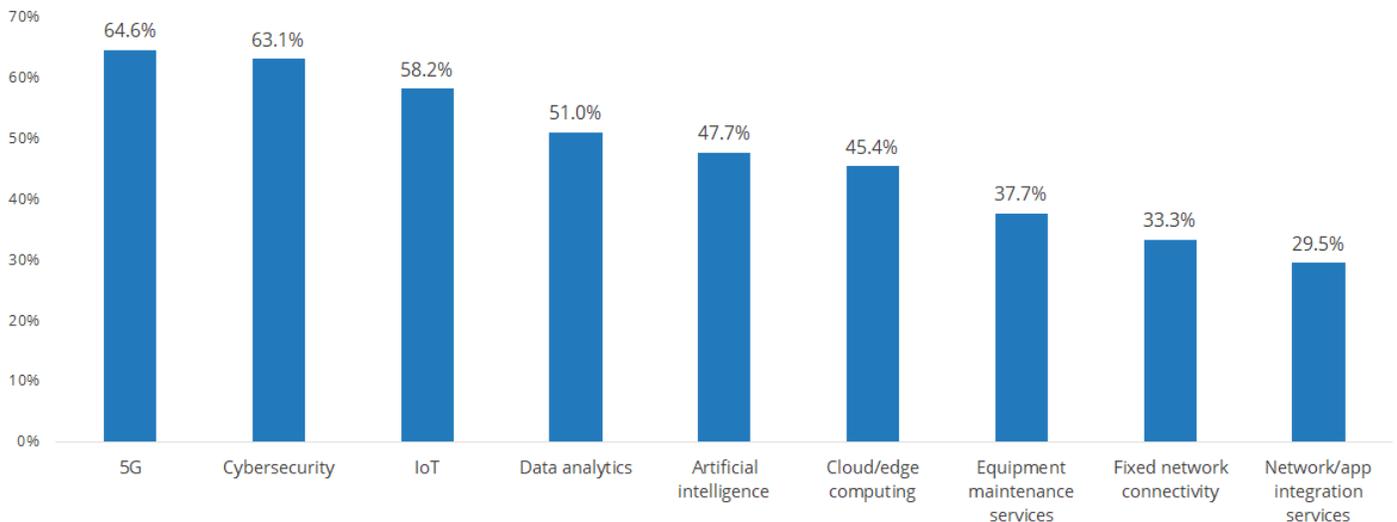
- » Retailers are facing changing economic conditions and customer expectations.
- » Wireless technologies are helping retailers digitize the customer experience and achieve business results.
- » Private 5G networks, multi-access edge compute, and managed IoT connectivity services work well together to address retailer challenges.
- » Selecting the best managed services partner is critical to a successful retail digital transformation.

There are a variety of 5G private network models. A 5G private network can be fully owned by the business, allowing the retailer to solely control access, security, and other network features. A service provider can also own the 5G private network and lease the network to the customer usually for a monthly fee through a managed services model. Finally, 5G private networks can be established using a hybrid ownership approach, whereby the retailer owns the on-premises infrastructure but connects to a public network for wide area coverage, as necessary. Figure 1 shows the technologies and services in a private mobile network that retailers find most relevant.

Combining managed, customized 5G networks with multi-access edge compute (MEC) offers even more possibilities and supports a new set of low-latency use cases reliant on edge compute. The deployment of edge compute with private networks will provide the necessary ingredients, namely high bandwidth, ultra-low latency, and compute capacity, to support real-time applications such as intelligent logistics, automation for checkout and order pickup, and robotics.

FIGURE 1: **Additional Services and Technologies for Private Mobile Networks**

Q Which of the following additional services and technologies would you consider to be important when purchasing or running a private mobile network?



n = 390

Source: IDC's North American Enterprise 5G, IoT, and Private Mobile Networks Survey, August 2022

The Internet of Things and Cellular Connectivity

Internet of Things (IoT) solutions are made up of hardware, software, connectivity, and services that can be applied to a range of vertical markets and use cases. IoT connectivity, essentially how an IoT device or sensor transmits data from the device to the IoT platform where it is analyzed, is critical to an IoT project.

The value of connectivity to IoT projects can't be overstated. Cellular IoT connectivity is one type of IoT connectivity that leverages commercial cellular networks integrating generational cellular technology standards such as 4G (LTE) and 5G using licensed radio spectrum for both wide area coverage and private networks.

Managed IoT connectivity services are offered by mobile network operators (MNOs) and mobile virtual network operators (MVNOs), as well as other third-party providers. Typically, vendors and mobile operators offer capabilities for enterprises and organizations to integrate these solutions with other systems — such as a customer service application — as well as create custom rule sets.

IoT connectivity management platforms (CMPs) are part of managed IoT connectivity services and help keep cellular-oriented IoT deployments up and running. These products provide data on IoT network connectivity and device status, allowing retailers to effectively monitor, manage, and secure IoT device rollouts. Managed IoT connectivity services help reduce the complexity for IoT projects by allowing a retailer to manage an IoT deployment through a single pane of glass.

Fixed Wireless

Fixed wireless access (FWA) service provides a reliable and cost-effective option for a retailer's internet connectivity requirements. FWA, in conjunction with 5G technology, is a scalable high-speed broadband option. Most FWA service speeds are more than sufficient to provide primary connectivity in support of a retail location and key applications (e.g., point of sale, digital signage, kiosks), or the service can be used as a backup connection to ensure 24 x 7 connectivity. With self-install options, FWA service can be set up by an onsite employee in less than an hour. Many providers offer unlimited data plans, which allow a retailer to control costs and avoid unexpected charges. Generally, there is no up-front hardware cost, only the monthly service plan charge.

Retail's Changing Dynamics

Many trends in the retail sector signify a continued and growing reliance on wireless technology. Retailers will increasingly rely on collecting and analyzing data and then applying what they have learned to engage with customers and automate processes more intelligently. The way forward requires absolute focus on the consumer. About 50% of consumers told us via IDC's *Retail Consumer Survey* that they will abandon a store or shop elsewhere if expected services or transparency to inventory data, orders, loyalty, coupons, and so forth are not available. Retail brands know this. It is no surprise that customer retention is one of retail's top 3 objectives right now (source: IDC's *Global Retail Operating Models Survey*, August 2022). If retail brands want to keep a customer, they need to anticipate customer needs to proactively engage in meaningful experiences. Current consumer journeys need to be facilitated by utilizing insights drawn from shopping patterns to drive next best actions prescriptively, proactively, and autonomously.

The top 3 areas of innovation for retailers are all dependent on data and insights to drive greater customer satisfaction and operating efficiency — 62.5% are focused on the innovation of store operations, 50.9% on marketing, and 48.2% on customer experience (source: IDC's *Global Retail Operating Models Survey*, August 2022; n = 800).

» How store operations have changed:

- The store is more than a physical place to buy goods — it is an omni-channel hub for digital and physical shopping, experiences, and order fulfillment and returns. Almost half (49%) of retailers report that the operating model is changing (source: IDC's *Future Enterprise Resiliency and Spending Survey, Wave 7, August 2022*; n = 63 retailers). Beyond the day-to-day expansion of the role of the store, retailers are also monetizing customer traffic and purchase data sourced from stores.
- Technology is enabling unprecedented levels of workforce enablement, self-service, digital engagement at the shelf, and accelerated checkout, fulfillment, and returns. At the center of this shift are reliance on cloud, data analytics at the edge, low-latency networks, and mobile devices. The shift is also cultural and people centered, and thus one of the 2023 retail predictions states that by 2023, 75% of enterprise retailers will double pre-pandemic deployments of mobile devices for associates to empower employees to improve customer service through continuous learning, communication, and operational guidance.

» How marketing has changed:

- Marketing now engages the consumer through every stage of the shopping journey — and most importantly through the first three: discovery and exploration, engagement, and conversion. Marketing can improve acquisition and conversion rates by autonomously presenting personalized discovery tools (search, browse, recommend) that match consumer expectations for value, values, fulfillment, service, and support; enable real-time customer engagement along the entire journey with visibility to orders, subscriptions, browsing history, inventory, and agents; and automate the connection between shopping lists, goods owned and replenishment, subscriptions, valued offers, fulfillment, and service via convenient and personalized interfaces.
- Importantly, outcomes need to be measured and monitored to ensure optimization of personalized experiences by accessing near-real-time data to contextualize offers, coupons, and engagement (source: IDC's *Global Retail Operating Models Survey, August 2022*). IDC surveyed 800 retailers worldwide that reported the following marketing initiatives take priority: 86 % are investing in marketing optimization (price, promotion, spends, etc.), 66% in targeted marketing campaigns, 58% in personalized coupon offerings, 44% in responsive digital signage, and 37% in targeting/acquiring the right customer segments through personalized offerings.

» How customer experience has changed:

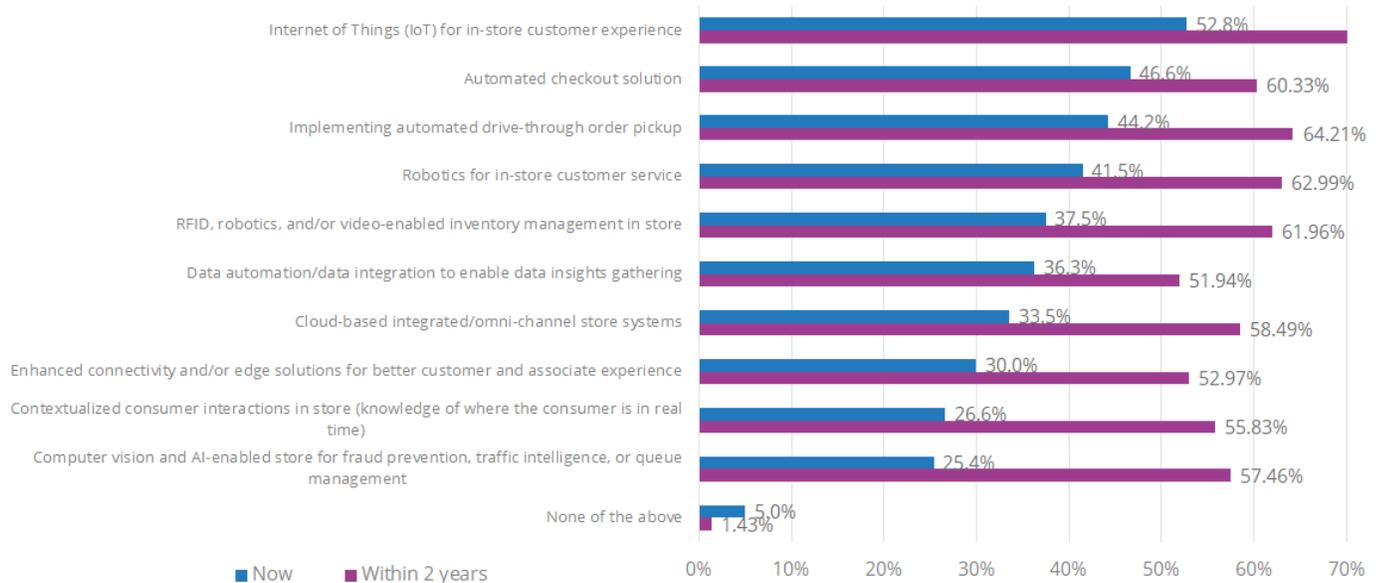
- The customer is still king and, in fact, has higher expectations than ever before because they know retail brands can provide more convenience and better product assortments through the utilization of technology. But as inflation continues to impact the cost of doing business, the companies that are thriving have mastered maintaining and growing their customer base by innovating to serve the customer better, which drives revenue growth and profitability.
- Retailers are prioritizing the following investments to enable even more convenience and service excellence: 56% are investing in real-time customer care services, 53% in product discovery and search (e.g., images, voice, text), and 50% in quick (one-click) commerce (source: IDC's *Global Retail Operating Models Survey, August 2022*).

How Technology Solves Retailers' Problems

The combination of private mobile networks, MEC, and IoT technology are powerful tools to help navigate the changing retail landscape and allow sector-specific solutions, and retailers are investing accordingly (see Figure 2).

FIGURE 2: *IoT and Automation Top Investment Plans in Store*

Q What is your strategic plan for the following store operations technologies?



n = 503

Source: IDC's Global Retail Operating Models Survey, August 2022

The following are just a few of the many ways retailers are implementing wireless solutions:

- » **Customer analytics and engagement solutions to improve experience and customer lifetime value (CLV):** Occupancy/traffic monitoring can detect occupancy and monitor utilization, allowing retailers to manage space more efficiently, quickly identify problems, and improve users' experiences. Queue detectors and traffic management applications analyze the flow of motion, its pace, and the number of people standing in line to detect overcrowding at checkout stands and curbside pickup. Heatmap activity tracking includes camera-based technologies that help retailers track what customers touch, ignore, and walk to within the store, so they can optimize store layouts, automate inventory replenishment, and contextualize customer engagement in-aisle. Real-time imaging tracks customer movements and then turns that information into heatmaps and data that can be utilized to enhance customer experience.
- » **Real-time inventory and asset tracking solutions to improve asset utilization and inventory performance:** To effectively sell across all channels, retailers invest in systems to manage omni-channel order and returns orchestration, inventory, automated replenishment processes, and effective supply chain distribution networks and partnerships. These are all dependent on data visibility, prescriptive data analysis and insights, and efficient and effective execution. Various technologies including shelf sensors, cameras, robots, and RFID are applied in

omni-channel retail to provide visibility to inventory everywhere. Trailer tracking monitors trailer data points such as trailer location, movement and speed history, and internal temperature to ensure a retail store's goods arrive to a location on time and in good condition. In addition, powered equipment such as hand lifts and pallets and other heavy equipment used in the retail back room or inventory facility can be tracked in real time. A variety of assets and inventory, including materials in containers or pallets, high-value items, goods that have special needs such as refrigeration, and fragile assets, can be tracked in a variety of conditions, from indoors to harsh outdoor weather.

- » **Safety and security solutions to benefit the in-store experience and reduce risk:** Retailers protect people, physical assets, and product inventory in distributed operations. Sensors, cameras, and software help them identify and correct problems that lead to product shrinkage, employee safety and satisfaction, and customer risk reduction and satisfaction. Loss prevention and RFID devices are classic theft-related shrinkage preventatives, but temperature and humidity sensors can be used to enable the proper handling of product that reduces product loss due to spoilage. Retailers can create an optimal work environment with indoor air quality monitoring, protecting customer and retail employee health, and meeting indoor air quality regulations. Technology can also provide a ring of security that includes push-button alerts to security, real-time intrusion and restricted area management, and reliable wireless service to analog devices such as door entry intercoms and security panels.

Managed Services Providers Reduce Complexity for Retailers

Mobile network operators have deep-rooted experience working with businesses to address their needs, often using managed services models. Managed service providers have developed comprehensive vendor ecosystems that allow retailers to select different hardware and software vendors to build its network. The service provider can then deliver an end-to-end network incorporating all the tools the retailer requires with one bill and support point.

Managed service providers can also assist in managing who has access to the network, issuing SIM cards, and monitoring network performance to identify and correct potential problems before those problems impact network performance. They can also provide managed IoT connectivity services to track IoT devices and ensure the best network connectivity and pricing models.

T-Mobile for Business – Retail Solution Portfolio

T-Mobile for Business offers a portfolio of solutions to address connectivity needs for retailers. The operator's Advanced Network Solutions (ANS) provides advanced connectivity through a private or hybrid network that incorporates MEC. T-Mobile's Advanced Industry Solutions (AIS) offers IoT connectivity, including global services through the T IoT service in partnership with Deutsche Telekom, a business internet service that offers a high-speed broadband primary or failover option for retailers, and a portfolio of solutions specific to retailers that includes sensors, video, fleets, and asset tracking options.

Retailers can address many of their challenges with the help of these wireless solutions. These technologies provide the connectivity to determine metrics for walk-in foot traffic, temperature monitoring, window display effectiveness, tracking goods, converting passersby into customers, determining queue length, detecting objects, and more. The metrics can then be measured and analyzed to ensure a successful retail operation.

Challenges

Some retailers may choose to deploy a managed Wi-Fi network instead of a private mobile network. While Wi-Fi networks do not allow the security and control of private 5G networks, they are less expensive and less complex than private 5G networks. In addition, a retailer can take advantage of the unlicensed Citizens Broadband Radio Service (CBRS) spectrum available in the United States to deploy its own private mobile network working directly with an equipment provider, without involving a mobile network operator such as T-Mobile.

Conclusion

The retail market will continue to face challenges as consumer needs and the economic environments continually change. Wireless technology, including private 5G networks, MEC, and cellular IoT connectivity, are tools that retailers can leverage to gain advantages over their competitors and improve customer experience. Managed services offer a cost-effective and unintrusive way for retailers to take advantage of available wireless solutions. T-Mobile for Business is a trusted partner for retailers looking to implement wireless technology as an option to turn the various retail challenges into opportunities.

About the Analysts



Sandra Wendelken, Senior Research Analyst, Mobile and IoT Services

Sandra Wendelken is a Senior Research Analyst for IDC's Telecom and Mobility team focusing on mobile and IoT services. In this position, her research covers the mobile operator market in the United States and globally. She provides detailed analysis on IoT connectivity services, public safety and first responder communications service offerings, managed private mobile networks, and other emerging service trends in the mobility market.



Leslie Hand, Group Vice President, IDC Retail and Financial Insights

Leslie Hand is responsible for the research direction and teams supporting IDC Retail Insights and IDC Financial Insights. Hand works closely with the teams to help guide technology suppliers and buyers to develop best practices and strategies, aligned with where they are and where they want to go, leveraging IDC quantitative and qualitative data sets. Hand's specific research focus includes a particular emphasis on the digital transformation of the future "store," which operates in real time, is AI enabled, and connects omni-channel customers to the frictionless, "touch-free", and secure experience that they desire.

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