NOKIA

Smart retail improves the customer experience

Developing customer-centric retail

The retail industry has been transformed by digital technologies. Online commerce has changed the playing field by dramatically improving the customer experience. Traditional retailers are responding by carrying out their own transformation of the customer experience, adding digital as a new layer to the in-store experience by using wireless to make personalized offers, consolidating online and in-store inventory, optimizing layout and flow of customers and ensuring security with closed-circuit TV (CCTV) analytics. Looking to the future, retailers can begin to use beacon technologies and augmented reality (AR) applications to guide shoppers to new products, offer in-store coupons and incentives, provide loyalty points and employ customer-aware digital signage.

All of these innovations require an upgrade to the traditional retailers' communications systems. Legacy networks lack the flexibility and agility of online systems and are managed as separate islands, often with inconsistent performance hampering the ability to deliver video and AR. Security breaches have been commonplace and the attack surface will only increase as retailers further digitalize their operations. To be successful, they will need an intelligent, high-performance cloud network with policy and analytics capabilities to support these exciting new capabilities. In addition to improving the customer experience, this digital platform should decrease operational complexity, increase reliability, visibility and security, and provide a platform for quickly innovating new offers and services.

Nokia and retail

Nokia is a global leader innovating the technologies at the heart of our connected world. We understand that smart, dynamic networks will be the foundation for the digital transformation of society, including our shopping experiences. The Nokia Bell Labs Future X architecture includes a programmable smart network fabric that supports and fosters new applications and services for greater productivity and innovation, richer experiences and enhanced quality of life.

As a leader in digital communications, we believe that building this dynamic, connected platform is the best starting point for improving the retail experience and putting a renewed focus on the customer. We call this the Future X architecture for the customer-centric retailer.

The digital retail environment

By necessity, today's retailers are transforming into tech companies as innovation in retail technology is becoming a critical differentiator. For the largest retailers, such as Walmart or Amazon, the distinction between brick-and-mortar vs. online is being blurred. Walmart competes online, just as Amazon has developed a real world presence with its purchase of grocery retailer Whole Foods, 20 new physical bookstores in the US and the launch of multiple new AmazonGo locations (Bloomberg reports 3,000 will rollout in the US by 2021).

Mobility is playing a big role in merging online and in-store. Armed with smartphones, customers now expect a seamless experience that follows them wherever they roam — comparing prices, researching products, ordering from the online catalog — all while shopping on the store floor. We are already witnessing salespeople armed with tablets who greet shoppers fully apprised of their history and online identity. With full visibility of the store's inventory, they can have items brought to the customer directly that aren't on the shelves or order them on the spot for home delivery. And they are able to use the customer's online payment details to make the transaction, bringing one-click purchasing in-store. Machine learning can be applied to the data on shoppers' behavior to optimize product layout and flow.

IoT promises to further blur the world between online and in-store retail. Adding beacons, cameras and RFID tags digitalizes the physical experience. By adding in-store digital signage and AR technologies, available today on the most advanced smartphones, it will be possible to help customers navigate to products, make in-store coupon and loyalty point offers, provide customers with further information and customer reviews on products, and offer relevant suggestions based on the products in which they show interest. These technologies will effectively bring the online experience to retail locations.

UK Pillar	Retailers plan to		Timeline
Personal	75%	use Wi-Fi to ID in-store customers via module devices	End of 2019
	80%	suggest products based on previous purchases	Within 3 years
Mobile	89%	offer mobile solutions for sales associates	Within 3 years
	84%	use mobile POS	Within 3 years
Seamless	71%	have a unified commerce platform	End of 2019
	60%	have centralized POS	Within 2 years

Source: Cybera, BRP POS/Customer Engagement Survey 2017

This seamless customer continuity and concierge-like in-store experience was previously only found in very high-end retail, making it possible for mass retailers that leverage technologies such as artificial intelligence and machine learning. Paired with data analytics, these are the engines driving personalization on multiple channels simultaneously. Algorithms fed with live streaming data make it affordable to create a more personalized experience for the customer. They can also help in operations such as purchasing, inventory management and asset maintenance.

One of the key ingredients in the digital transformation of retail is the network. Typical retail locations have had very light networking needs, mostly for inventory management and point of sale (POS) systems. In order for them to transform and align their in-store customer experience with that of the online world, they will need much more robust backend support. Mobile coverage for smartphones and tablets, beacons, video and digital signage is not trivial: the loads add up and will require automated and intelligent broadband and wireless solutions that need to adapt to the ever-changing demands. They will also need to have a multi-cloud strategy that links services from both HQ-based private data centers and public clouds that empower their online presence, with customer-premises-based local edge clouds needed to support in-store automation and other low-latency applications such as AR.

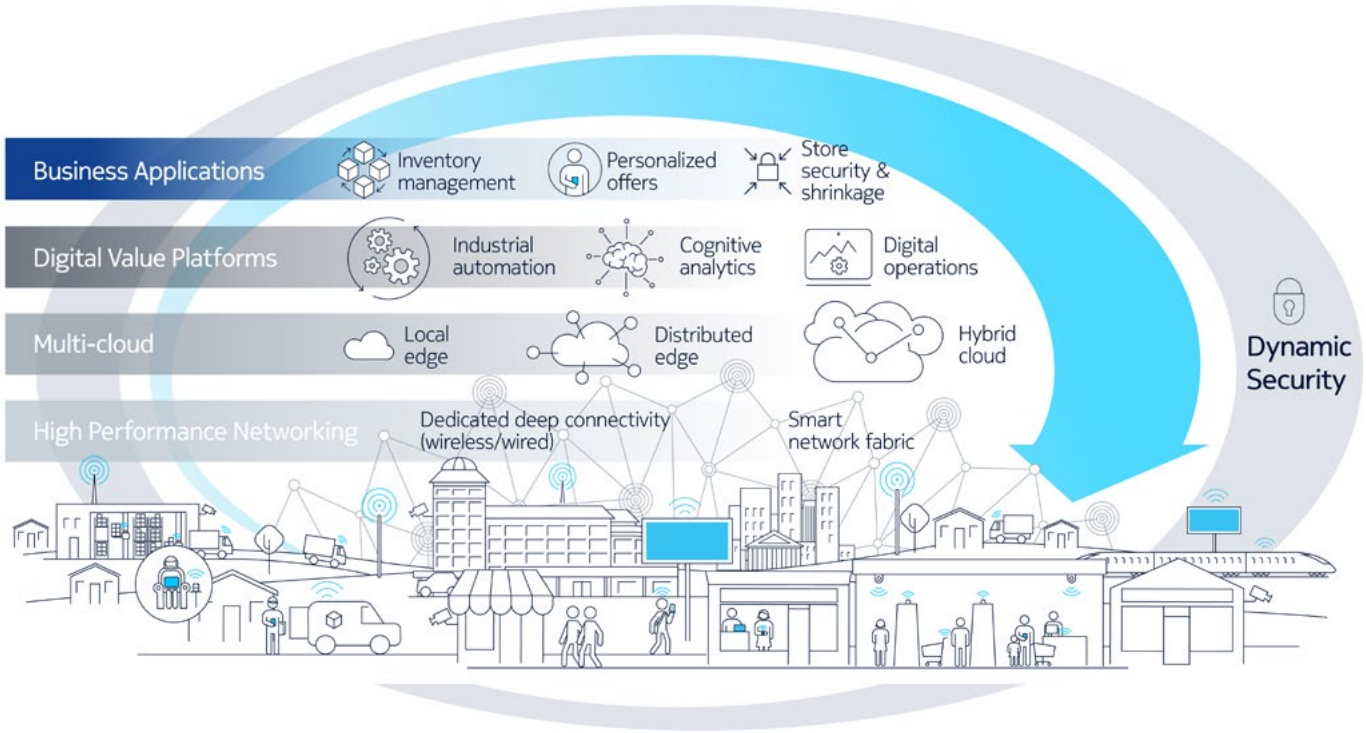
Other IT capabilities can be shared between applications. For instance, most of the applications described above require advanced analytics for processing online and in-store data, including video and streaming data from AR apps. Machine learning and artificial intelligence capabilities, digital operations and IoT and device management can be used across a variety of digital retail applications. All of this needs to be wrapped in advanced cyber-security systems that not only protect against breaches, but have robust incident response mechanisms.

Leading retail revenue multipliers for 2017*

Ubiquitous return options	Return purchases from any channel to the store
Global inventory visibility	Check inventory from any channel or location
Ship from store	Item-level RFID enables faster delivery & lower shipping cost
Central order management system	Global order tracking and visibility
Split-ticket ordering	Fulfill a single order from multiple channels

Source: Cybera, 2017 Store Systems Study: Racing Ahead At The Speed Of Retail

The Future X architecture for the new digital retailer



The future of retail is being shaped by the customer-centric online experience. To replicate it in-store will require a new vision for the retail network. The Nokia Future X architecture for retail provides an intelligent, dynamic communications and cloud-based platform as its foundation. This platform will be able to program and automate the smart network fabric dynamically interconnecting all of the individual systems, processes and activities, consolidating many existing systems and providing integrated analytics and machine-learning support for innovative applications and services.

At the deepest level of the Future X framework lies dedicated universal broadband connectivity, both wireless and wired, making every kind of communication and information exchange possible. Overlayed on this is a software-defined, dynamic programmable mesh fabric that leverages a high-performing IP/optical core, using wireless to connect with beacons, sensors, inventory and POS systems, cameras, tablets and customer smartphones, all securely and with the highest reliability.

Cloud technology is essential to the Future X architecture, ensuring the flexibility, scalability and universal availability of both data and intelligence. Placed throughout the network fabric, local and distributed edge clouds ensure the ultra-low latencies required for video analytics, automated responses and AR-based navigation. Cloud-native, software-defined networks dynamically allocate capacity, ensure service level agreements, implement security, and route application traffic wherever it's needed — whether to support massive file transfers or video streaming.

Built into the Future X architecture are data processing capabilities and analytics, including machine learning and artificial intelligence systems. These ensure that, out of the ocean of data on assets, inventory and streaming data on customer behavior, relevant and actionable insights can be enabled to improve and personalize customer experience. Device and IoT management are paired with operational systems to provide an open, digital value platform that can be harnessed by any kind of retail application.

At Nokia, we believe this Future X architecture will help retailers to launch their digital transformation. They will be able to create a new shopping experience for customers and compete directly with online competitors on their own terms, leveraging their local presence. With it, they will be able to align the online and in-store presence, exploit new digital opportunities and create an increasingly customer-centric retail experience.

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Use cases for digital retail:

Personalized offers and omni-channel

Customers now expect omni-channel experiences, meaning there is continuity between the various channels they use, such as online and in-store. What they begin online, they expect to finish in-store and vice versa. Personalization is one of the features of the online world that needs to be transferred to the in-store experience. In-store beacons that connect to the customer's smartphone can, with permission, transfer profile information from online to in-store. By better understanding buying preferences, recent purchases or buying cycles for that customer, the system can be configured to offer suggestions and give out loyalty coupons. These offers can be made in-store or online. For instance, customers might receive weekly emails offering coupons on items that the system knows they habitually purchase. This might be done to reduce over-stocked goods or as loss leaders to bring customers to the store. If the customers accept the offer, they can be notified that the item is in the store and will be navigated to the place in the store where the item is located, or they can choose in-store pickup or home delivery.

Inventory management

Digital transformation of retail is about the integration of the different areas of the business through data. In the online world, this means, for instance, that when items for purchase are no longer in inventory, the website no longer shows them as available for sale. This is because data in the inventory system is integrated with data in the website. In the best case, it will show the date when it will be re-stocked and offer the shopper products that are like the out-of-inventory product. Some of this same functionality can be deployed in-store using smartphone apps and digital signage. Ideally, improved inventory analytics can also help avoid these issues by analyzing current and historical data to predict when outages are likely to occur, suggest alternate suppliers and identify the need to re-balance inventory across the network.

Store layout and flow optimization

Flow optimization in retail stores is changing. Customers used to shopping online become more easily frustrated when they can't quickly find what they're looking for. Retailers have to adjust their layout strategies based on actual shopping behavior data. Whereas large retail stores traditionally designed their layouts so that customers are forced to navigate past displays of items, such as those most likely to be purchased on impulse or popular items that frequently need replacing, these tactics may need to change. While brick-and-mortar shoppers enjoy the more hands-on experience, they may not be as willing to wander and browse as they once were. More effort may need to be put into kiosks and interactive digital systems that help the customer find their product faster. Video analytics, smartphone apps and beacon interactions can all be used with machine learning to analyze customer flows and optimize them for customers as their habits and preferences evolve.

Store security and shrinkage

CCTV has long been used to ensure the security of staff and customers and to limit shrinkage. However, ensuring that security personnel remain alert and monitor all behavior on the floor is difficult. Fortunately, video analytics programs now exist that can out-perform security staff. They are capable of spotting anomalies in behavior and drawing attention to them or even sounding alerts. When mixed with RFID tagged products, they can drastically reduce shrinkage. In one of the most advanced trials of video analytics mixed with RFID, AmazonGo stores have successfully implemented systems that allow smartphone-carrying customers take goods off the shelf and walk out of the store without going through a cashier POS. This showcases the sophistication that these systems have reached.

Customer case story:

Retailer innovates with digital wallets

Unbanked borrowers in emerging markets face numerous hurdles in gaining access to credit. Micro-lending has proven to be a good solution in many cases, but it still leaves them entirely out of the digital commerce chain, which relies on having a bank account to enable credit and debit transactions. This is a problem for retailers hoping to build digital presence with all of their customers.

This retailer is creating an alternate smartphone-based payment system that is supported end-to-end by a Nokia software-defined network. The network uses digital wallet technology based on blockchain currency, but unlike Bitcoin and Litecoin, which use prepaid cards, this technique is directly linked to a cryptocurrency balance, similar to normal banking cards, and is specifically designed for retail. Cash-only shoppers can have their cash converted by the participating retailer to build their online balance. They can use the digital wallet for online and in-store payments.

In the future, the digital wallet network will even be able to offer small loans directly in app. The key to the credit risk model is the ability to match personal data of the customer (by permission as part of sign up) with actual transaction data, whether purchases or loans. Machine learning builds a trustworthiness score using all of the customer's personal and behavioral data to determine credit worthiness. Global peer-to-peer lenders participate through blockchain to provide the capital to underwrite the loans.

Offers for omni-channel, customer-centric retail

As a leader in mission-critical enterprise communications, we believe that the Future X network architecture is the best starting point for achieving a smarter, customer-focused, synchronized retail experience across all retail channels. Nokia is well placed to support retailers with more than 30 years of experience in the sector and a complete portfolio of fixed and mobile products and services. Nokia has a long history providing first X.25 and TDM, then IP networks for retail POS and inventory management. Nokia knows the complexities and requirements of migrating from legacy to IP-based networks, as well as moving from Wi-Fi to more robust 4G/LTE and 5G networks, including indoor coverage.

Complementing our full portfolio of both mobile and fixed network solutions, Nokia also contributes its professional retail services to help investments and smooth migration of legacy systems to the next generation of network and cloud-based technologies. Bell Labs Consulting services will help you with planning for the future and understanding the business case benefits of new technologies using a structured methodology for establishing quantifiable outcomes for the retail sector.

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From the enabling infrastructure for 5G and the Internet of Things, to emerging applications in virtual reality and digital health, we are shaping the future of technology to transform the human experience.
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