



WILIOT'S INDOOR ASSET INTELLIGENCE SOLUTION FOR RETAIL

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CONTENTS

- Executive Summary1**
- Challenges Across the Retail Supply Chain.....2**
 - On-Shelf Availability (OSA).....2
 - Outdated Inventory Management Systems.....2
 - In-Store Fulfillment of Online Orders3
 - Importance of Omnichannel Models.....3
 - Persistent Worker Shortages4
 - Theft of Goods on the Rise4
 - Regulation4
- Resolving Challenges with Wiliot's Ambient Data Platform.....5**
- Implementation Recommendations.....7**

EXECUTIVE SUMMARY

Retailers wrestle with myriad challenges of getting the right products to the right place at the right time. Shifting consumer behaviors, changing fulfillment methods, workforce constraints, and growing regulatory pressure are factors that retailers of all forms and sizes are contending with. The effects of such challenges are further compounded by outdated inventory management processes and technology that is not fit for new purposes.

The first step in tackling any of these challenges is attaining comprehensive visibility by establishing a digital connection with inventory at every stage of the supply chain. And this is where Wiliot's ambient Internet of Things (IoT) solution comes in. Ambient IoT is the next generation of the IoT, connecting inventory to the Internet to deliver real-time triggers about the location and condition of products at the unit or case level, without the need for manual scanning or human intervention.

This brief examines:

- Where retailers are currently falling short.
- How Wiliot's ambient IoT solution can not only tackle current challenges, but significantly optimize retail operations at both a distribution and store level.
- What retailers should consider when integrating the technology.

CHALLENGES ACROSS THE RETAIL SUPPLY CHAIN

On-Shelf Availability (OSA)

Getting stock to the shelves requires inventory to be accurately receipted, processed, tracked, and distributed. Without stock on the shelves, sales cannot be made.

The global average OSA rate sits at around 92% to 94%, meaning that 6% to 8% of items are out of stock at any one time. The impact of this can be substantial; poor OSA has lost large retailers upward of 4% in sales annually. Where substitutes may be possible in certain areas, research has indicated that up to 30% of customers would not purchase a substitute product, leading to both loss in revenue and customer loyalty.

While stock-outs can often be a result of supply issues or poor forecasting, often it is because the stock has not been correctly managed within the store. Store assistants are often trying to cover multiple roles and often have very little visibility of what stock needs to be brought out, what stock they have, and what stock needs to be cycled quicker based on changing buying habits.

Stock-out alerts would increase OSA



Outdated Inventory Management Systems

The National Retail Federation (NRF) estimates that issues with inventory management, whether that be overstocked or understocked, costs the U.S. retail industry over US\$1.1 trillion annually. Stock is sent to stores to be sold based on forecast sales and available supply, but getting stock into customers' hands and providing signals back up the supply chain to improve future supply is entirely reliant on store inventory management processes.

A core issue is that around 70% of retail employees have reported to still be using paper-based formats to conduct their retail audits. Not only can this be heavily subject to human error and be incredibly time consuming, it is also far too slow for high-paced retail segments to be adequately reactive. Without a central platform that is receiving live inventory information to allocate tasks accordingly and provide alerts for re-stocking, retailers are running blind and consistently playing catch up.

In-Store Fulfillment of Online Orders

Changing shopping habits have forced retailers to offer various means of purchasing products. E-commerce has boomed, but so has new in-store fulfillment methods such as Buy Online Pick-Up In Store (BOPIS), creating additional ways that retailers must manage and allocate their inventory via their physical stores.

Growing over 500% during the pandemic, BOPIS strategies have continued to increase, with over 90% of retailers expected to adopt some form by the end of 2024. Major brands have continued to leverage this strategy as a happy medium between online and in-store shopping. As of the end of 2023, Target reported to be fulfilling 95% of its e-commerce orders from its store footprint.

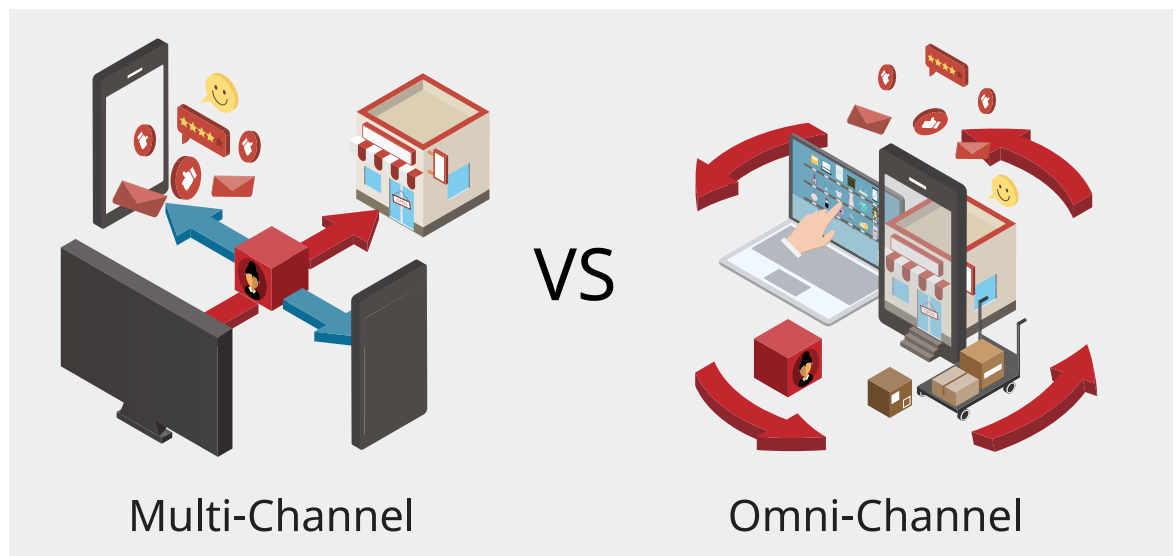
The effectiveness of such strategies is, however, entirely reliant on how well inventory can be managed and how well stock is tracked to provide the right signals to the online store. Despite BOPIS maturity, retailers continue to report limitations in their capabilities and high numbers of canceled orders due to legacy inventory systems that create a misalignment between stated and actual availability.

Importance of Omnichannel Models

Growth of e-commerce and omnichannel fulfillment has created additional delivery routes from Distribution Centers (DCs) and taken reverse logistics to new heights. Both require increasingly granular and real-time tracking of inventory to ensure allocation to the right truck and any shipping exceptions are recognized and dealt with before wider knock-on effects can occur.

The introduction of returns charges by retailers, including H&M, ZARA, SHEIN, and ASOS, is a key example of the costs that increasing reverse logistics can have on large retailers. Effective inventory management that harmonizes inbound and outbound stock movements is not only imperative for profitability, but also for ensuring customer loyalty.

Multiple channels of fulfilment



Persistent Worker Shortages

Attracting and retaining workers in the retail sector has been a continued challenge. The quit rate is estimated to be 70% higher than in other industries, driven largely by lower pay, erratic schedules, and monotonous tasks. In many countries, the number of retail employees continues to fall. In the United States, ABI Research forecasts that the number of retail employees will fall by a Compound Annual Growth Rate of -2.8% through 2030, exceeded by the United Kingdom and Germany at -5% and -4.8%, respectively, with smaller but persistent drops expected across other European nations.

Considering the adjacent challenges discussed above, their effects become amplified when being tackled by a shrinking workforce. Less available staff means fewer people monitoring stock-outs, processing deliveries, and ensuring inventory flows through the store.

Theft of Goods on the Rise

Stolen inventory is a growing issue in retail, both in stores and DCs. In the United States, incidents by organized retail crime increased by 26.5% in 2024 compared to 2023. It is the same story in Europe. A study by the British Retail Consortium revealed that total crime experienced by retailers had doubled in 2023 compared to 2022, while a report by European Alliance for Safe Retail (EARS) reported the cost of retail crime had increased to €16.6 billion in 2022. The statistics become more alarming when considering that DC and store staff are responsible for around 40% of overall theft.

When addressing the drivers and causes of this increase, reports have pointed to organized crime groups exploiting weaknesses in retailers' inventory management and DC operations. Increasing volumes and lack of granular visibility create ideal environments for theft, whether by organized groups or staff at the facilities. Additional complexity and the increase in temporary staff are also exacerbating the issue, creating stock-outs and lost sales that ultimately create a greater financial burden passed on to consumers.

Regulation



Mandatory regulations in Europe, followed swiftly by North America, are forcing retailers to establish greater visibility of their supply chains. Digital Product Passports (DPPs) are

becoming necessary digital records to provide comprehensive information to regulators, with supporting technologies receiving significant investment. ABI Research forecast 100% of all apparel sold in the European Union (EU) will have a DPP by 2028, followed by over 40% adoption in North America by 2030.

Regulations that will require increasing asset visibility by retailers include:

REGULATION	REGION	DATES	DESCRIPTION
Eco-design for Sustainable Products Regulation (ESPR)	Europe	In force from 2024	Mandates product design that enhances durability, repairability, and recyclability for a wide range of products, including textiles and electronics.
Corporate Sustainability Reporting Directive (CSRD)	Europe	Applied in stages from 2024	Requires companies, including large retailers, to report on Environmental, Social, and Governance (ESG) factors, providing greater transparency on sustainability practices and risks.
Waste Framework Directive and Extended Producer Responsibility (EPR)	Europe	Mandatory by 2025	Obligates retailers to take responsibility for the end-of-life management of products, including textiles and packaging, promoting recycling and waste reduction.
The California Safer Clothes and Textiles Act (AB 1817)	North America	Adopted September 2022 and coming into force January 2025	Aims to ban the use of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS).
New York's Fashion and Sustainability Act	North America	Not yet signed into law	All fashion companies in New York that generate more than US\$100 million are required to map at least 50% of their supply chains and make this information publicly available online.
U.S. Securities and Exchange Commission (SEC) Climate-Related Disclosure Rules	North America	SEC adopted final rules in 2024	Requires public companies to disclose their Greenhouse Gas (GHG) emissions, climate-related risks, and their impact on business operations and financial performance.

RESOLVING CHALLENGES WITH WILIOT'S AMBIENT DATA PLATFORM

Meeting such challenges requires both visibility and data control. In many cases, retailers have siloed Inventory Management Systems (IMs), patchy asset tracking solutions, minimal data analysis capabilities, and manual stock management processes that are exposed to human error.

Ambient IoT is a solution that can directly resolve these current limitations inside retail stores and facilities, offering autonomous, granular, real-time tracking of stock as it enters and leaves these locations. Wiliot, a leading ambient IoT solution provider, offers a complete solution for retailers, not only providing the technology to digitalize retail products, but also ingest and process these data in the most seamless way possible.

The Wiliot Ambient Intelligence Platform at a glance:

- IoT Pixels (battery-free Bluetooth® stickers) integrated with individual shipping labels, applied to individual product cases, or applied to Reusable Transport Items (RTIs).
- Bluetooth®-based network devices installed in DCs, store backrooms, and/or shop floors that energize the IoT Pixels and relay their sensing and location data to the cloud.
- Data are fed into Wiliot's cloud-based Ambient Intelligence Platform that utilizes Artificial Intelligence (AI) and Machine Learning (ML) for data analysis, as well as device management and connections to Enterprise Resource Planning (ERP) or IMSS.

This ambient IoT architecture for Wiliot's Indoor Asset Intelligence solution enables retailers to seamlessly automate processes under the roof, while also adding new capabilities and insights that were previously unseen with this level of granularity.



USE CASE	BENEFIT
Inventory Confirmation	Live, automated stock information removes manual tracking errors and labor, while providing stock allocation plans based on real case-level data of what was actually received.
Workflow Alerts	Notifications to store workers when products are misplaced, eliminating falsely reported low/out-of-stocks and identifying inefficient or error-prone workflows.
Asset Tracking	Monitor assets under the roof with real-time visibility into asset inventory and locations, reducing shrink events and labor spent searching for missing assets.
Reusable Asset Management	Optimize pallet, tote, and roll cage usage with passive inventory visibility, enabling usage rate monitoring and ensuring First In, First Out (FIFO) so orders are never put on hold due to misuse of those assets.

IMPLEMENTATION RECOMMENDATIONS

- **Collaborate with Stakeholders to Identify Data Hotspots:** Start with existing product data, map current product information upstream and downstream, identify where the data are insufficient, and collaborate at an early stage to identify data and technical interoperability that work for your ecosystem. Targeting adoption of ambient IoT solutions can yield a much faster Return on Investment (ROI).
- **Establish Strategic Partnerships to Support Rollout:** Engage in shaping regulation through strategic partnerships with regulators, suppliers across the value chain, and solution providers. By engaging multiple stakeholders, data integration can be facilitated, and the benefits of additional visibility can be shared to maximize benefits to inbound supply.
- **Evaluate, Budget, and Plan:** Digital readiness of internal and external stakeholders will determine the timeline to implement ambient IoT platforms. Ensure that system upgrades, various integration processes, and interoperability of Information Technology (IT) systems are carefully considered.
- **Identify to What Extent Systems Are Siloed and May Affect the Effectiveness of Additional Inventory Data:** Currently, big brands have multiple fragmented ERP, operation management systems, and Lifecycle Assessment (LCA) systems in action, while smaller brands are still using basic Excel. It is important to consider how the new data feeds can be supported and where information will be accessed to ensure that adoption of ambient IoT platforms does not create added complexity.
- **Educate Your Organization from the Shop Floor, All the Way up to Central Planning Departments:** Set working groups with internal and external stakeholders to educate about changes to operations and systems. Establish best practices and create support channels with the solution provider to ensure providing continuous training and enablement.
- **Shift Product Value to Functionality:** Implementing an ambient IoT data platform will open new ways of interacting and engaging with customers. The concept of selling product functionality, rather than one-time purchase goods drastically changes the customer interaction with the product and value. Work with solution providers to understand how data can be leveraged and ensure personnel are educated on new possibilities.



Published January 2025
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About the Sponsor

Wiliot is a company engaged in the design and development of ambient IoT and ambient intelligence products. Wiliot's Ambient Intelligence Platform brings the physical world online using IoT Pixels, battery-free smart tags that push data to the cloud, via Bluetooth®, in real time without relying on manual labor or scans. Wiliot's mission is to add intelligence and automation to products, packaging, and transport assets—enabling responsive, dynamic supply chains.

ABI Research Empowers Technology Innovation and Strategic Implementation.

ABI Research is uniquely positioned at the intersection of end-market companies and technology solution providers, serving as the bridge that seamlessly connects these two segments by driving successful technology implementations and delivering strategies that are proven to attract and retain customers.

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