Increasing Profitability for Brick-and-Mortar Retailers

Intel® Retail Sensor Platform Delivers Near 100% Inventory Accuracy

The Intel® Retail Sensor Platform is an end-to-end solution designed to help system integrators and retailers quickly create and deploy innovative retail solutions informed by analytics.

Extending Technology Benefits to Brick-and-Mortar Retailers

In the digital data-driven economy, retailers face unprecedented challenges. Online shopping is defining consumer expectations that brick-and-mortar stores “have what they want, when they want it.” Retailers have access to more data than ever before, but the sheer volume of data can make actionable insight difficult to discern. New technologies are available, but multiple vendors and protocols can make implementation complex and costly.

Now, Intel is delivering a flexible, secure foundation to simplify smarter retail. The Intel® Retail Sensor Platform provides better inventory tracking, faster time to insight from retail data, and gives retailers the tools to increase customer satisfaction.

With Intel, retailers have access to insight currently available in the online retail world. Even a modest investment in digital technologies can improve profitability.

Here, we will examine the retail insights and powerful new usage models supported by the Intel Retail Sensor Platform. This end-to-end retail analytics solution is designed to help system integrators and retailers create and deploy innovative retail systems.

Increasing Inventory Accuracy

There are numerous benefits for retailers who adopt digital technologies, and they all start with an accurate assessment of inventory. Inventory distortion—in the form of overstock, stock-outs, and shrinkage—represents a nearly $1.1 trillion issue for retailers worldwide.¹ Inventory shrinkage alone is a $42 billion problem for retailers in the U.S., a number that represents nearly 1.5 percent of total retail sales.²

Imagine if a retailer can account for nearly 100 percent of its inventory. No more customers lost because sales associates are not able to locate the particular item the customer is looking for, no more marking down overstock inventory below cost, and no more time wasted by sales associates running around the store and back to the stock room looking for misplaced inventory and items in need of replenishment. The Intel Retail Sensor Platform delivers this capability in a simple-to-install, easy-to-manage, and secure fashion.

Inventory distortion is only one of the issues the Intel Retail Sensor Platform addresses, giving system integrators an architecture that delivers fast time to market, ease of install, automatic data security, simple manageability, and flexible customization.

¹ Inventory distortion is a significant issue for retailers worldwide. It represents a nearly $1.1 trillion problem.
² Inventory shrinkage alone is a $42 billion problem for retailers in the U.S., representing nearly 1.5 percent of total retail sales.
Solution Benefits for Retailers

Research from McKinsey & Company indicates the potential economic impact of IoT on retail will range from $410 billion to $1.2 trillion per year by 2025.1

RFID technology is primarily used to track the movement and location of inventory. It can also be analyzed, in conjunction with other retail data, to identify new methods to increase retail profitability.

Technology-enabled usage models include:

**Minimizing Inventory Carrying Costs:** Retailers without accurate inventory tracking will often order more than necessary to avoid stockouts. This can result in higher inventory carrying costs and excess product that will need to be marked down later. Alternatively, RFID-based inventory tracking solutions can help ensure inventory is adequately stocked, and when stock levels become low, suggest reorder quantities based on point-of-sale (POS) data.

*Reducing stockouts and overstocks, in addition to enabling timely replenishment of inventory, can help lower inventory carrying costs by up to 10 percent, with an impact of $5 to $15 billion per year by 2025.*

**Reducing Missed Sales Opportunities:** Poorly stocked shelves can lead to lost sales when customers are unable to find what they are looking for or decide to take their business elsewhere. At times, the desired items may already be in the store, whether in the back room or misplaced. Using RFID-based solutions to track inventory at a sub-category level (based on size, color, etc.), it is possible to send replenishment alerts or misplaced item notifications to sales associates.

*Improving the chances of completing transactions during customer interactions by ensuring on-shelf availability, and enabling sales associates to show the customers the exact items that they are looking for can raise sales by as much as 11 percent in certain areas, such as luxury goods, increasing revenue by $12 to $52 billion per year by 2025.*1

**Deterring and Detecting Inventory Shrinkage:** When customers and employees know products are being tracked, they are less likely to steal. Inventory tracking using RFID technology supports this, while tracking suspicious product movement.

*Implementing IoT technologies could reduce losses by the equivalent of one-half to one percent of the cost of goods sold, a value of $23 billion to $92 billion per year in 2025.*1

**Optimizing Product Placement:** “Location, location, location” is the mantra of many business owners, and the same can apply to product placement. Inventory movement data from RFID sensors, combined with video analytics and anonymous customer path mapping, helps retailers identify premium traffic areas, learn how customers interact with specific items, discover which products are complementary or typically “abandoned,” and identify relevant information, including consumer preferences and conversion rates.

*Optimizing store layouts can increase productivity by five percent, leading to a possible value of $79 million to $1 billion in 2025, according to McKinsey & Company.*1

**Increasing Sales Associate Effectiveness:** Customers perusing merchandise trigger an RFID-based inventory tracking system, which can prompt sales associates to provide assistance, if they are not already doing so. This capability can help retailers manage their employees more effectively, putting them where they will have the greatest impact on sales.

*Using advanced analytics to better determine the number of employees needed and to more effectively deploy staff throughout the store can result in a 10 percent reduction in staffing costs, worth an estimated $10 billion to $19 billion per year in 2025.*1
Improving Order Fulfillment: Today’s customers expect the flexibility to buy an item online and have it shipped from a warehouse or picked up in a physical store—an omni-channel experience. To fulfill these online orders, some retailers are choosing to use their brick- and-mortar stores as warehouses, rather than utilizing dedicated fulfillment centers. This requires accurate and up-to-date inventory visibility at each store location, a capability RFID helps to provide. Without this insight, retailers are likely to expend more time and resources to fulfill orders.

Expanding Customer Services: Enable customers to view detailed product information, such as customer reviews and recommended items, when they bring a specific item into the fitting room. Provide your customers with the capability to request a different size or another product by sending a message to a sales floor associate—all without having to leave the fitting room.

IoT Architecture for Retail
An end-to-end IoT solution for retail provides the necessary ingredients to securely send RFID and other sensor data to the cloud for analysis by business-class applications.

The solution (Figure 1) features several key components:

- **Retail IoT sensors** detect inventory movements and provide other data for analysis.
- **Gateway**, located at the back end of the store, collects sensor data and sends it to the cloud.
- **Cloud and big data architecture** ingests and analyzes retail data.
- **External APIs** enable software developers to easily integrate new and innovative applications.
- **Application software** performs various retail functions, such as inventory location tracking, replenishment notifications, misplaced item alerts, and insight on customer consideration of individual items.

This scalable architecture takes data from multiple sensors and other sources and uses it to generate actionable insights specific to the needs of individual retailers. Application software for the Intel®-based gateway and the cloud are typically sourced by solution providers, including system integrators and third-party analytics vendors.

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**Figure 1.** A connected inventory management solution designed for retail
The Intel Retail Sensor Platform provides system integrators and retailers an out-of-the-box, advanced, in-store analytics platform. This simple-to-install solution manages retail sensors, such as RFID, through an Intel-based gateway, and supports analytics capabilities from the edge to the cloud. It also provides an easily deployable cloud and big data analytics architecture with Trusted Analytics Platform (TAP)—allowing system integrators to deliver applications that can boost retail profitability.

A key feature of the Intel Retail Sensor Platform is its flexible sensor suite. In the future, the solution will support numerous communication protocols and sensor capabilities beyond RFID, including video, Wi-Fi, and Bluetooth® low energy (BLE*). And, the Intel Retail Sensor Platform enables retailers to aggregate the data from multiple edge sensors to deliver real-time insight.

Gone are the days where retailers must string miles of cable through their ceiling tiles and consolidate several disparate streams of data at the back end. The Intel Retail Sensor Platform provides an all-in-one sensor that is simple to deploy and manage. With the ability to track every item in stores, analytics can provide new insights into product demand, consumer behavior, and store logistics.

**Intel® Retail Sensor Platform Architecture**

The Intel Retail Sensor Platform architecture, represented in Figure 1, is based on an industry-standard, open-software platform that can integrate multiple devices in a seamless and future-proof way. New functions and sensor capabilities may be added to the platform over time, all of which can be easily discovered, integrated, and managed. The architecture minimizes installation and maintenance costs by delivering a highly secure, multi-IP system with mesh networking for increased reliability. System integrators and retailers can write applications to the external API and analytics engine to access remote and local sensor data from the gateway, cloud, or metadata. This capability enables system integrators to develop their own customer user interface for any device of the retailer’s choosing.
Integrated Technologies

- **Intel®-Based Retail Sensor:** The Intel Retail Sensor (Figure 2) is currently an RFID reader and antenna that provides approximately 150 to 300 square feet of coverage per sensor at more than 600 tag reads per second from each sensor. Platform software runs on low-cost, low-power Intel® Quark™ system on a chip (SoC)-based modules. Future versions will provide a choice of Intel® processors and an expandable sensor suite.

- **Intel-Based Gateway:** The gateway finds, configures, and interacts with the Intel Retail Sensors over Ethernet without third-party middleware. Based on Intel® Core™ i7 or Intel® Xeon® processors, the gateway connects to the cloud via the Internet using a wired network, wireless, or 3G/LTE cellular network. Inventory location information can be processed by the gateway. Increasing the processing capacity at the gateway allows for scalable data ingestion from multiple sensors, data compression and filtering, and the capability to perform real-time analytics at the edge.

- **Cloud:** The Intel Retail Sensor Platform offers an open-source analytics platform-as-a-service (PaaS) for cloud applications. This cloud-based, horizontal platform (Figure 3) features an integrated stack that reduces complexity and gives greater control to businesses. It runs on both private (on-premise) and public cloud infrastructures. It can also be extended and customized by solution providers.

- **Trusted Analytics Platform (TAP):** Part of the cloud-based solution, TAP accelerates the creation of secure, high-performance big data analytics applications in cloud environments. Retail organizations may be hindered by the lack of data science skills required to implement a big data analytics solution and manage the complexity of a big data infrastructure. TAP includes the necessary tools, algorithms, and engines to make it easier for developers to collaborate with data scientists in a shared environment to conduct advanced analytics. Designed for developers and data scientists, this open source solution reduces development costs and time to market for the retail industry. TAP includes open source software with hardware-enhanced performance and security features, and features the following:
  - Data layer that includes Apache Hadoop*, Spark*, and other data components optimized for performance and security.
  - Analytics layer that includes a data science toolkit to simplify model development and an extensible framework to generate predictive APIs.
  - Application layer that includes a managed runtime environment for cloud-native apps.

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**Figure 4.** Intel® Internet of Things ecosystem partners help retailers garner insight
Intel Retail Sensor Platform: Key Benefits

The Intel Retail Sensor Platform is an integrated IoT solution that delivers the following advantages to system integrators and retailers.

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<tr>
<th>Benefit</th>
<th>Description</th>
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<tr>
<td><strong>Fast Time to Market</strong></td>
<td>The Intel® Retail Sensor Platform works out of the box and requires no hardware development or software patches, allowing the solution to be up and running at a retail location in minimal time.</td>
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<td><strong>Easy Installation</strong></td>
<td>Intel®-based retail sensors can be easily affixed to any wall or ceiling using a variety of compatible mounting mechanisms. All sensors run on power over Ethernet (PoE) to minimize cable installation requirements and eliminate signal loss across large areas.</td>
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<td><strong>Manageability</strong></td>
<td>Retail sensors are automatically detected and configured by the gateway, which then manages, controls, and coordinates them through MeshCentral® and helps sensors adapt to changes in the store. The gateway works with many types of sensors, allowing integration with existing store infrastructure.</td>
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<td><strong>Security</strong></td>
<td>Intel® Security solutions span both hardware and software to help deliver true end-to-end security for retail. With the Intel®-based gateway, system integrators and retailers can securely and seamlessly connect, aggregate, filter, and share data from the edge to the cloud.</td>
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<td><strong>Analytics</strong></td>
<td>Trusted Analytics Platform (TAP) provides a foundation for big data analytics on open-source Hadoop* and open-source OpenStack* for orchestration with private cloud or major public cloud providers.</td>
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<td><strong>Expandable Sensor Suite</strong></td>
<td>The Intel Retail Sensor Platform supports fixed RFID reading capability for real-time inventory. In the future, the sensor will also support video, PCI Express®, BLE®, and Wi-Fi.</td>
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<td><strong>Low Cost</strong></td>
<td>Intel Retail Sensor Platform is available through distributors at a price point significantly less than many RFID technology and retail sensor solutions. The benefits gained from accurate inventory can deliver substantial return on investment for retailers, and advanced analytics enabled by the expanded sensor suite can further increase the value gained through the deployment of the Intel Retail Sensor Platform.</td>
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The Retail Opportunity

This is only the beginning of the transformation possible for retail brick-and-mortar stores. For example, in the future, edge sensors will support video, Wi-Fi, Bluetooth, 3G, 4G, and LT. The resulting mapping and video analytics, combined with the Wi-Fi analytics, have the potential to create a richer in-store experience that mirrors the .com space and contributes to a consistent omni-channel experience for customers.

IoT technologies are being used to more easily connect things from the edge to the cloud in order to increase efficiency, reduce costs, and generate useful insights across many industries. The Intel Retail Sensor Platform provides system integrators and retailers with actionable insight that provides competitive advantages. This innovative, end-to-end retail solution provides a cost-effective, viable entry for today’s retailers—helping to increase profitability through near-real-time data analytics.

Intel Retail Solutions

Intel is enabling immersive retail experiences that help shoppers explore, dream, and connect with the brands they love. From real-time inventory management to customer engagement and personalized marketing, Intel retail solutions help drive profits and customer loyalty.

To learn more, visit [intel.com/retail](http://intel.com/retail).


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