Retail, RFID and the Internet of Things (IoT)

The Foundation

Much has been written about the importance of Omni-channel fulfillment in retail. Retailers realize that in order to stay competitive they must leverage an Omni-channel program which can expose their inventory to shoppers at any time – no matter its location. For Omni-channel programs to succeed, retailers must have total confidence in the accuracy of the inventory information they expose to customers. One way of setting the foundation for this type of cross-chain inventory accuracy is by implementing a radio frequency identification (RFID) enabled inventory management process, which can provide retailers with an accurate and timely view of their inventory, across all channels. It is this merging of channels that is key to the success of Omni-channel.

For the retailers that do embrace an RFID inventory management solution, it becomes more than just a new technology project, but rather a new way of doing business. As research has shown (and retailers have expressed publicly) RFID has enabled them to
improve their inventory accuracy from the industry average of 65%, up to 99+. By ensuring accurate inventory information, they now can expose a wider selection of products on their websites, expanding the breadth of items that are available for purchase online and increasing sales. Additionally, they benefit from reduced safety stock - that product that they must keep on hand to ensure in stock availability - which in turn leads to fewer markdowns and increased profit margins. Eventually, these kind of improvements become the new normal against which future years are measured and once they do, there is no turning back.

"I don't know how, in an Omni-channel, data-driven... world, you can take data accuracy lightly... The customer base is increasingly demanding. I want it. I want to know you have it. I want to tell you how I want you to get it to me. And I want to do that right now. If you don't have that level of confidence in your data, you have a pretty big problem."

Bill Connell
Senior VP of Logistics and Operations
Macy's

But these initial improvements only scratch the surface of what retailers can accomplish with inventory visibility. By laying this RFID-enabled foundation, retailers can build upon it in ways that can open up many other new opportunities. For example, this inventory accuracy and visibility that RFID provides can allow retailers to offer new ship from store options. Confident that a particular item is in stock at a location near the customer, online orders can now be routed to a store where that item can be pulled from stock and shipped at a lower cost than from a DC that may be several states away.
Building on the Platform

Buy Online, Pickup In Store (BOPIS - also known as Click and Collect in Europe) builds on this principle. With customers eager to get what they just purchased online, BOPIS drives foot traffic to the store, which in turn drives sales. One in four people who order online and pickup in store buy an additional item during the process of picking up their order. This could result simply from an existing need and the convenience of their already being in the store, or perhaps just because something that they would not have been exposed to otherwise catches their eye. In this way, having a physical store presence plays to a retailer’s advantage, which differentiates them from - and helps them compete against - strictly online retailers. High inventory confidence also allows retailers to move beyond their website and begin engaging with consumers on their mobile devices via a customer loyalty application. This enables retailers to expose stock to a shopper at any time in any place, and allows them to complete the purchase via whichever option they choose - picking up their purchase at a nearby store or having it shipped to their home.

“Over the past couple years Target has been on a journey to drive greater efficiency throughout its organization. At the core of these investments is inventory data, which is key to the retailer’s speed and reliability. The retailer has implemented RFID across a portion of its apparel assortment in more than 1,600 stores. “We saw a 26% growth in the third quarter, and the investments we’ve been making to improve functionality and ease online is certainly connecting with our guests.””

Brian Cornell
Chairman and CEO
Target

1. Retail Info Systems News, December 1, 2016
In this way, an RFID-enabled inventory visibility platform – providing accurate inventory information across all channels – can expose more styles and colors online, and reduce Out of Stocks. Taking this a step further, retailers can now place a focus on promoting items that they have only one of – perhaps a particular color, style, or size. Previously, due to a lack of inventory confidence, exposing these items to shoppers online would also expose high risk - risk that a shopper might execute a transaction only to find out later – perhaps at the point of pickup – that the item was not in stock and the order cannot be fulfilled. RFID-enabled accuracy can transform that process, providing a retailer with the confidence to promote single unit items to shoppers via their Omni-channel program.

“With unprecedented visibility into our inventory, we can now ensure a full assortment of our goods are on the selling floor and available for guests to pick up, try on and enjoy.”

Jonathan Aitken
IT Director
lululemon athletica

The Impact and IOT

This can have a big impact on sales productivity. On average, 20 percent of a retailer’s inventory falls into this single-unit category. This can happen by design (i.e. only one of a style is ordered due to selective demand), due to returns of non-congruent items (buying a suit, but returning the pants only) - or due to customer demand and quick sell through. Previously, short of marking it down, retailers really did not have a lot of options to sell through this product, and often did not even know they owned it, as it generally ends up sitting in backrooms. With RFID-enabled visibility into this inventory, retailers now can pick to the last unit. This inventory can be sent to other stores that
have better sell through potential, or more product can be moved into the current store or exposed to the web, saving on markdown and profit erosion.

In this way, RFID is clearly game-changing, but it is just one of the many sensor technologies available as we move toward a world connected by the Internet of Things (IoT) and the ability to give physical objects a digital voice.

The term Internet of Things was coined by Kevin Ashton while working for Procter & Gamble in 1999. The phrase "Internet of Things" started life as the title of a presentation linking at that time the new idea of RFID in P&G’s supply chain to the then-red-hot topic of the Internet. IoT is in essence the ability to connect the ever-growing network of physical objects to the internet and the communication that occurs between these objects and other Internet enabled devices and systems.

The concept of a network of smart devices was discussed as early as 1982, with a modified Coke machine at Carnegie Mellon University becoming the first internet-connected appliance, able to report its inventory and whether newly loaded drinks were cold. However, many people say the IoT’s roots go back even further. According to Intel, ATMs were the first end user-oriented elements to be connected online back in the 1970s.

A glimpse into the growth of the IoT shows that we have:

- 4.9 billion connected things
- Over 210 million people who own smart phones in the US
- Companies that will be spending nearly six trillion dollars on IoT solutions over the next five years
- 46% of retailers in the US that have deployed Bluetooth beacons in 2015 driving 4 billion in sales

Why are we seeing this growth? Due to a variety of reasons:

- Cost of the sensors, cost of bandwidth, and cost of processing has decreased
- Shrinking form factors
- The increasing availability of tools sets around big data and infrastructure
- An overall adoption of mobile devices allowing for increased connectivity
For a device to be considered as an IoT device, it has to be a sensor with internet connectivity and contain a processor. It also must be energy efficient, cost effective, reliable and secure. The IoT is fast becoming the platform that offers retailers the ability to create new customer experiences, grow revenue streams and drive new business models for today’s customer engagement. Following are just a few of the ways that the IoT is being integrated into store fronts...

1. **SMART MIRRORS** - Smart mirrors have been used in fitting rooms for some time to improve the shopping experience, although in limited scope, they provide a seamless experience in which a customer can view various options related to the different products they have brought into the fitting room. These options can include other colors and sizes, or like items available in inventory. They also enable the shopper to request different sizes or colors to be delivered to the fitting room, and can facilitate the completion of the sales transaction. The smart mirror improves the experience for the retailer as well, as they can now know what was brought into the fitting room, the conversion rate for that item, how long the item dwelled in the fitting room, and notify them quickly if an item has been left in the fitting room so that they can quickly get the unsold items back on the sales floor.

2. **ENDLESS AISLE** - Endless Aisle gives customers the ability to find the product they want and purchase that product directly from an in-store fixture whether the item is in stock or not. Customers can order and pay for their product and either pick it up in-store if it is available, or have it sent to their home if it is not. Pick-up orders are placed immediately and fulfillment is fast. This enables a brand to retain customer loyalty while making a sale that they potentially might have lost if the product was not on the sales floor. The process is seamless to the customer. To the customer, it appears that the retailer has an endless supply, or aisle, of products and is never truly out of stock. When items are out-of-stock, customers tend to look elsewhere for the product. 17% would use their mobile device to make an immediate purchase at a competitor’s site, 37% would buy that item from an online retailer when they get home, and 35% would go to a different
store to buy it. Endless aisle provides customers with a seamless shopping experience that leads to better customer satisfaction.

3. **DIGITAL SIGNAGE** - Digital Signage utilizing e-ink technology has been deployed at several retailers to show the current price of items on display. Taking this a step further and leveraging multiple technologies such as RFID to ascertain presence of product, digital signage can provide automatic updates relevant to the product on display, while saving labor and knowing that the price on the product is correct.

4. **CONNECTED ASSOCIATE** - Most retailers have deployed some type of mobile computer to enable basic functionality to the store associate, such as price lookup or order entry. By using these devices to prioritize the most critical tasks, for example identifying associates and directing them to assist customers or to restock merchandise.

5. **LOSS PREVENTION** - Loss prevention is another area where a combination of IoT devices - including electronic article surveillance (EAS) and RFID - can alert that a product went out the front exit without payment, but also identify that exact item down to the style, color and size. This allows the retailer to replenish the item so they are not out of stock for the next customer who may be looking for that item, but also look at remerchandising the item that left, as perhaps it is located in an area of the store that needs better visibility.

6. **BLUETOOTH BEACONS** - Bluetooth beacons are indoor IoT locationing devices that enable a better customer experience. For the retailer, the solution provides instant visibility into where customers are in a store and the ability to automatically take the best action, interacting with a device the consumer typically has in hand, their smart phone. It is a way for retailers to best serve customers at any time during their visit. Beacons also give insight as to where in
the store customers are shopping, what items are being looked at, what dwell times may be and if return visits are happening so that a connected associate may be sent to that location to assist. An overwhelming 86 percent of today’s shoppers are willing to pay more for goods in return for a better customer experience. Beacons can help deliver service with a difference, and result in improved sales and loyal customers.

7. **OVERHEAD INFRASTRUCTURE:** Overhead data capture and sensing technology extends visibility to all merchandise, assets, customers, and employees within the four walls. By automating data capture technologies like RFID via overhead form factors, these solutions allow for near real-time data collection, providing insight on relevant immediate business events. In doing so, they are able to capture, analyze and act upon current stock status, inventory visibility, granular locationing, and effectively support Omni-channel and e-commerce programs.

**Connecting the Walls**

But IoT is not just about the inside of the four walls. The Internet of Things seeks to connect items beyond the four walls of a retail store or Distribution Center as well. Trailer Load Analytics (a Zebra Technologies Solution) and Smart Packaging are two such solutions that integrate IoT capabilities with items and processes outside of the store and DC. Trailer Load Analytics uses sensors to optimize trailer loading. Today the average trailer carries 30 percent air, and only 70 percent product. Using IoT devices, trailers can be loaded to their maximum while maintaining load integrity and protecting cargo. Smart Packaging, which refers to integrated sensor labeling, can be utilized as well to monitor movement and temperature, providing in-transit visibility to shipment metrics to ensuring quality goods upon arrival. Both solutions can improve fleet efficiencies, save labor, reduce costs and help to get the product to the retailer at just the right time for the consumer.

Virtually all IoT applications strive to connect the physical with the digital world. RFID is just one of the many technologies helping retailers today sense, analyze, and act upon data that they just didn’t have visibility to before. This kind of visibility allows for consistent messaging, pricing and service across in-store, online and mobile touch
points with the consumer. It provides a foundation for Omni-channel and e-commerce programs to stay competitive in the marketplace. It’s really about getting back to the roots of retail and connecting with the customer.

For more than 40 years, Zebra Technologies has developed the building blocks of today’s Internet of Things (IoT) technology with its global leadership in the Automatic Identification and Data Capture (AIDC) market including sensors, barcodes, printers and RFID. The arrival of the cloud and the ubiquity of wireless networks have made connecting devices and mining their data much easier, and the IoT is bringing us into a new age in which the line between the physical and digital is blurring.