Wiliot

CASE STUDY · 2023

RETAIL PHARMACY

Bringing real-time intelligence to a retail pharmacy supply chain

A leading retailer used Wiliot IoT Pixels to monitor the location and temperature of reusable plastic bins and individual pharmaceuticals — from distribution centers, through transit, to the store.

WHAT THE DATA REVEALED

PEAK TEMPERATURE OF A PHARMACEUTICAL IN TRANSIT

94°F

17°	Above the manufacturer's maximum safe temperature
15°	Variance between top and bottom bins on a pallet
1 hour	Unplanned stop at a store, captured in real time



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Monitoring bins and pharmaceuticals from distribution center to store

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RESULTS AT A GLANCE

$800M–1.5B
PLASTIC PALLET AND CONTAINER LOSS IN THE U.S. EACH YEAR

$35B
LOST ANNUALLY TO TEMPERATURE-RELATED ISSUES IN PHARMA

30%
ATTRIBUTED TO COLD CHAIN LOGISTICS ISSUES

94°F
PEAK PHARMACEUTICAL TEMPERATURE IN TRANSIT

15°
VARIANCE WITHIN A SINGLE PALLET

Millions
OF IOT PIXELS NOW BEING DEPLOYED

01

Executive summary

The role of retail pharmacies in the United States has expanded beyond providing medicine to customers. These establishments have become multi-faceted retail destinations that offer a wide range of products including household items, beauty products, and groceries. However, as the inventory of these retailers continues to grow, it has become increasingly challenging to maintain a seamless supply chain. With limited staff numbers and new products being added to their shelves daily, retailers are experiencing growing pains in keeping their inventory organized and delivering efficiently, while also ensuring quality, safety, and regulatory compliance. These inventory issues ultimately impact costs, sales revenue, and customer loyalty.

A leading retailer is collaborating with Wiliot, an ambient Internet of Things (IoT) pioneer, to tackle these challenges. Wiliot's innovative technology, battery-free IoT Pixels, and cloud-based analytics engine enables a ubiquitous IoT that can create a fully transparent supply chain. This retailer aimed to bring real-time intelligence to reusable plastic bins and individual products to ensure timely delivery, quality maintenance, and compliance with safety and regulatory standards.

With Wiliot technology, the retailer was able to monitor the location and temperature of goods from various locations within distribution centers, through transit, to the store.

Based on data transmitted by Wiliot IoT Pixels integrated into the bins, the retailer was able to tell a story of how each bin moved through the supply chain, including:

- The total bin to pallet ratio, where a bin is on a pallet, and how a bin is handled at each stage of the supply chain.
- The total time it took for each bin to travel from each location.
- The total time a bin spent at each stage of the supply chain.
- The location of individual bins through the supply chain.
- The temperature of individual pharmaceuticals and the duration the pharmaceutical was at each temperature.
- The temperature of the bin at each stage in the process and the duration the bin was at each temperature.

Leveraging the insights provided by the Wiliot Physical AI platform, the retailer was able to gain unprecedented visibility into its supply chain operations. By analyzing the real-time data captured by Wiliot IoT Pixels, this retailer was able to:

- Pinpoint areas where they could optimize their processes and reduce bin shrink.
- Identify potential quality management issues and take proactive measures to address them, thus ensuring the safety and efficacy of their products.
- Improve the retail experience by streamlining its inventory management and delivery processes and exceeding its customers' needs and expectations.

02

The challenge

$800M–$1.5B

Plastic pallet and container loss within the U.S. annually[1]

$35B

Lost annually by the pharmaceutical industry to temperature-related issues

30%

Of disposed temperature-sensitive pharmaceuticals attributed to cold chain logistics issues[2]

Apart from the direct loss of the container and its contents, shortages of reusable containers like reusable plastic bins can result in indirect costs that disrupt production, leading to expensive downtime and consequential effects. The shortage can cause delays in processing and delivering orders, which can result in increased labor costs, freight charges, and potential loss of sales. IoT Pixels' data would not only enable cost savings by detecting the precise location of each asset but also allow the retailer to identify shrink/loss within their supply chain by following the pallets/bins throughout their journey.

Additionally, temperature-related issues cause the pharmaceutical industry to lose approximately $35 billion annually, of which 30% of disposed temperature-sensitive pharmaceuticals[2] can be attributed to cold chain logistics issues.

Although the financial impact of this loss is significant, the potential harm caused by ineffective vaccinations and degraded pharmaceuticals cannot be measured in monetary terms. The availability of these statistics implies that there is a certain level of monitoring in place.

However, these methods are retrospective and only provide data that confirms when the product has already been compromised. It is more effective to implement a proactive system, that's where Wiliot comes in.

To prevent issues in the supply chain, it is necessary to have actionable and valuable insights that can identify, anticipate, and prevent problems.

Prior to implementing Wiliot technology, the retailer had no comprehensive way of monitoring products from a distribution center to a store. However, if the retailer could observe shipments digitally—including the temperature at which it's kept—from its operational control center, the retailer could identify the bin's real-time location to prevent the loss, find ways to shorten the time it takes inventory to arrive in stores, work with employees on more efficient ways to palletize bins to maximize space and ensure temperature compliance in transit, and see real-time sales of specific units and receive immediate restocking alerts, and expiration date tracking so store associates can know when a SKU is out of stock before it happens.

The retailer worked with Wiliot to implement reusable plastic bins enhanced with integrated processors that could communicate their location and temperature in real-time. These bins were tagged at the distribution center using ultra-low-cost Bluetooth wireless networking infrastructure that transmits data to the cloud for analysis. This combination of hardware and software is referred to as the Wiliot Physical AI platform and serves as the foundation of an intelligent, safe, and more profitable supply chain.

03

The Wiliot Physical AI platform

The Wiliot Physical AI platform combines Wiliot IoT Pixels — the sticker-sized brains of the platform affixed to any kind of product or packaging — and the Wiliot Cloud, which collects data transmitted from IoT Pixels allowing for AI-driven analysis and decision-making.

IoT Pixels are ultra-low-cost, self-adhesive tags that can be battery-free, powering themselves by harvesting radio frequency energy from their surroundings. Each includes a programmable CPU core, a Bluetooth Low Energy Wireless Micro Controller Unit (MCU) that can sense, compute, and communicate, and 128-bit AES (Advanced Encryption Standard) encryption so the data it sends is secure.

All Wiliot IoT Pixels have sensing capabilities, including temperature. The ability to measure disruptions in the environment is a proxy for various usage insights, such as an item moving. These sensing capabilities are achievable with any Wiliot IoT Pixels. Humidity and proximity sensing will be available in 2023.

IoT Pixels communicate wirelessly over standard — and often existing — network infrastructure, such as the Bluetooth-enabled Wi-Fi access points that are commonly installed by stores to enable connectivity for their customers and their own wireless devices. This ability to leverage existing Bluetooth-enabled infrastructure is key to streamlining deployment and minimizing the barriers around infrastructure costs that have held back other technologies and restricted the use cases that were possible.

Wiliot IoT Pixels send data securely to the Wiliot Cloud, where it is decrypted and made available for analysis. The Wiliot Cloud transforms raw sensory data into insights and uses machine learning and artificial intelligence to automate essential functions such as alerting staff when pharmaceuticals handling processes are out of compliance.

04

Solution and results

Wiliot conducted a project for this retailer for the tracking of reusable plastic bins and specific pharmaceutical products from distribution centers, through transit, and to a designated store. The retailer chose specific pharmaceutical products to be tracked at the item level, in addition to the bin level, to ensure compliance with regulations.

Wiliot IoT Pixels were attached to the front and back of the retailer's reusable plastic bin, where their temperature sensors were activated to collect and transmit information about the conditions of the bins. Bluetooth readers and communication gateways were installed in the distribution centers, trucks, and stores to read data from the IoT Pixels and transmit them wirelessly to the Wiliot Cloud.

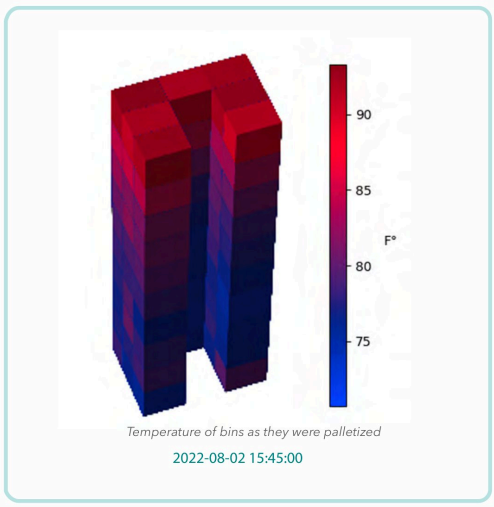
As each reusable plastic bin traveled from the distribution center to the store, the retailer could track its precise location and monitor the time at each destination. This revealed incidents in the transportation route that had been unseen until now. For example, a shipment was intended to go directly from DC #2 to DC #1 to Store #12.



Shipment route captured with Wiliot's IoT Pixels' data

Real-time data from the IoT Pixels exposed that the truck used to transport the bins made an unplanned stop at Store #106 for an hour. The location data allowed for the retailer to see the end-to-end journey of each bin, from an individual forklift to the staging area, to the outbound area, to the truck.

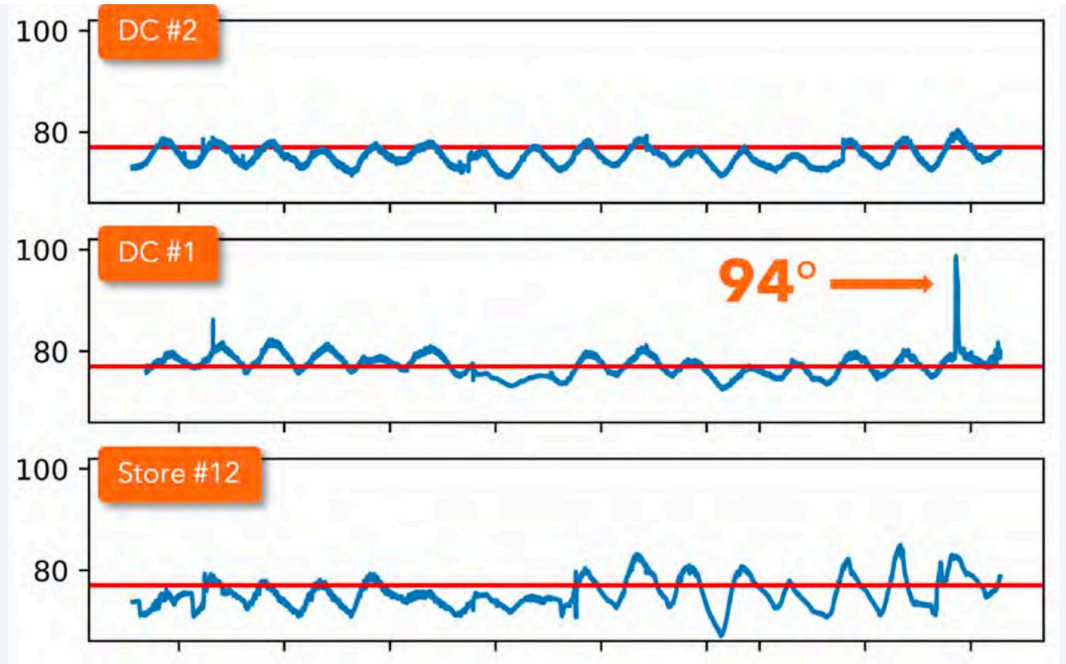
In addition to seeing the precise location, the retailer saw the temperature data which allowed them to see the real-time temperature of bins as they were palletized. Throughout their journey, Wiliot leveraged the data to create 3-dimensional maps of the pallets to understand how the temperature varied within a single pallet and inside the truck.



Temperature of bins as they were palletized

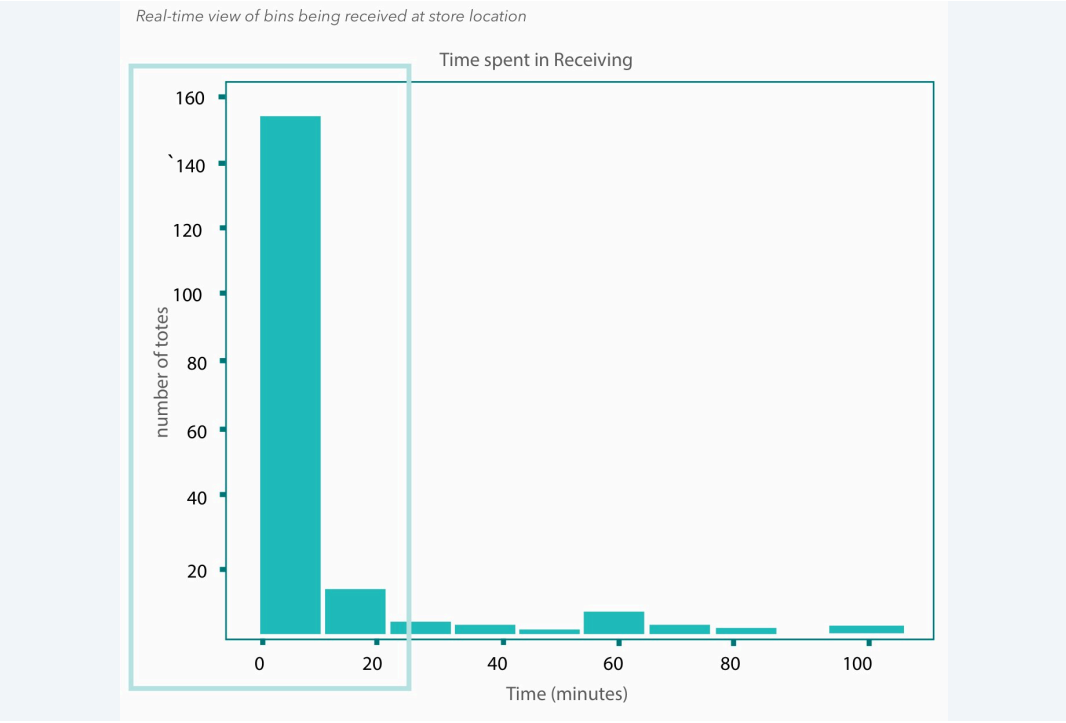
15°

The data revealed that there was up to a 15-degree variance between the bins at the bottom and the items at the top.



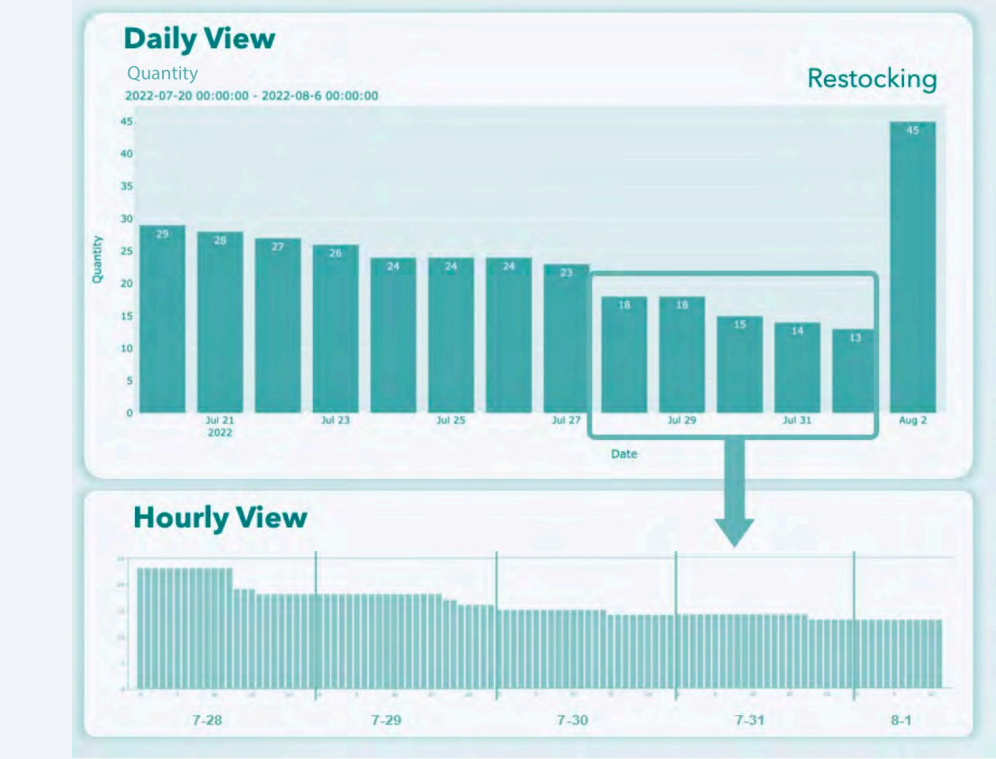
Temperature (F) of a pharmaceutical product over time through various sites

At the item level, a pharmaceutical product exceeded the manufacturer's maximum safe temperature by 17 degrees, reaching 94 degrees during transit.



Real-time view of bins being received at a store location

Bin level tracking showed the difference between a theoretical receipt process versus an actual receipt process. Today, individual bins are assumed to be received when the truck is received, despite there being thousands of bins in each truck. The real-time data provides actual bin level/time when specific bins are brought inside and received.



Real-time view of a pharmaceutical product's inventory

The retailer was able to see real-time sales of specific units of the pharmaceuticals tagged at the item level, adding visibility beyond daily POS statistics. This enables immediate restocking alerts, and expiration date tracking. Store associates can have visibility into when a SKU is low on stock before it reaches out of stock.

By utilizing the analytics capabilities of the Wiliot Cloud, Wiliot data scientists presented the retailer with detailed data visualizations that depicted the journey of each bin. This included the duration spent at each stage of the supply chain and the temperature of the bin throughout. The system also provided real-time visibility into the sales of each product, allowing the retailer to improve its retail experience with accurate inventory management.

Based on the success of the implementation and the platform's ability to deliver actionable insights, the retailer and Wiliot are now beginning to deploy what will be millions of Wiliot IoT Pixels.

05

Conclusion

During the project, the retailer was able to uncover valuable insights. By leveraging Wiliot's Physical AI platform, they were able to identify supply chain inefficiencies that needed to be addressed in order to achieve their goal of ensuring timely delivery, maintaining quality, and complying with safety and regulatory standards.

With real-time insights provided by Wiliot IoT Pixels and cloud-based analytics engine, the retailer can monitor the location, temperature, and journey of their products. This unprecedented visibility into their supply chain operations enables them to optimize their processes, reduce bin shrink, and ensure the safety and efficacy of their products. The insights gained from the Wiliot Physical AI platform also improve their retail experience by streamlining inventory management and delivery processes, better meeting their customers' needs and expectations. The future of the drugstore and retailer industry is bright, and with Wiliot, the possibilities are endless.

SOURCES

[1] LeBlanc, R. "Pallet and Reusable Loss Statistics." Reusable Packaging News, 25 June 2015. https://packagingrevolution.net/the-staggering-numbers-for-reusable-packaging-and-pallet-loss/

[2] Barrowclough, N. "The Cost of a Broken Cold Chain in the Pharmaceutical Industry." Pharma-Mon by AKCP, 20 Aug. 2020. https://pharma-mon.com/drug-storage-monitoring/the-cost-of-a-broken-cold-chain-in-the-pharmaceutical-industry/

ABOUT WILIOT

Wiliot is a Physical AI company that gives organizations continuous, scan-free visibility into the location and condition of every item in their supply chain. Battery-free Bluetooth sensors, called IoT Pixels, capture the data, and the Wiliot Physical AI platform refines it into actionable insights — predicting problems like shrink, mis-ships, and spoilage, and recommending the next move. Trusted by many of the world's largest retailers, carriers, and consumer brands, Wiliot has tagged more than 1 billion assets worldwide. Visit www.wiliot.com to learn more.