



SMART SUPPLY CHAIN & LOGISTICS USE CASE



A Fresh Approach to Asset Quality Management

AXINO DISRUPTS COLD CHAIN REFRIGERATION TO ENSURE
FOOD QUALITY



FOOD QUALITY MATTERS MORE THAN PRICE

In grocery retail, the fresh food category comprised of fruits, vegetables, meat, fish, dairy, and baked goods accounts for about 40 percent of revenue. These food offerings are a strong driver for grocery chain customer traffic and loyalty. Fresh food is fiercely competitive among retailers and is becoming even more critical. Traditional grocers are being challenged by increases in sales from convenience stores and box retailer home delivery services.

McKinsey & Company recently released research from a Pan-European benchmarking survey of 23,000 grocery shoppers. Results indicated low prices and frequent promotions were attributes that increase customer satisfaction, but food quality and freshness ranked as the consumers' highest concerns. According to the research, grocers can boost sales by as much as 10 percent by improving fresh-food practices and policies.

“Quality is no longer a ‘nice-to-have’ as before, it is a critical necessity for retailers to defend their market position. In response to increased demand for fresh food, most Swiss retailers have added 40 percent more refrigerated coolers to their stores within the past five years.”

Ihab Hourani, CTO, Axino Solutions

However, providing fresh food is a complex operation for grocery chains as prices are volatile, suppliers are fragmented and quality control processes of perishable products are laborious and costly. The process to measure temperature to address cold chain compliance regulations and to ensure fresh goods for consumers has primarily been accomplished by manually checking and recording temperature readings of refrigerated units and inserting a probe thermometer into food. This process, though labor intensive and wasteful, is the accepted industry norm.

HOW IT WORKS: AXINO



The step-by-step process of Axino's LoRa-enabled solution.

LoRa® Use Case

IoT Challenge

- Replace invasive manual core temperature monitoring of food
- Create retrofit solutions to work across legacy systems
- Pilot new technology to resolve industry issues

LoRa Devices Used

- LoRa devices enable low-power wireless technology
- LoRaWAN®-based networks provide public and/or private connectivity
- Wirelessly connected sensors communicate data to the Cloud

Business Value

- Remotely access and review temperature measurements
- Ensure quality fresh food for customers
- Reduce food waste and lost revenue

DATA DRIVEN FRESHNESS IN FOOD RETAILING

Axino Solutions (Axino) is a global leader in providing communication solutions and services. The company designs, implements and operates comprehensive turnkey, customized software Internet of Things (IoT) solutions that help companies of all sizes fully automate their digitalization processes.

Axino set out to develop an automated and continuous temperature monitoring system with innovative technology that could disrupt retail cold chain refrigeration. Axino and Zurich University of Applied Sciences conducted measurement research and tests on six categories of fresh food to detect their specific heat signatures and convection attributes and determine the optimal core temperature for freshness for each product, as well as evaluate products in a variety of real-world instances (e.g. packed in plastic, unpacked, sliced). In addition, researchers ran tests utilizing robotic arms to simulate the operating mode of customers opening doors to refrigerated chests and freezers.

After extrapolating the comprehensive research data, Axino developed a bespoke artificial intelligence algorithm that is highly accurate and can guarantee the core temperature of any food group item within one degree Celsius. Axino's digital measurement software and hardware components, combined with Semtech's LoRa® devices, are able to wirelessly detect and communicate the core temperature of a product with sensors placed inside coolers up to one meter away from the actual food items.



“The detection process is like magic. There is no other manufacturer who can predict core temperature of food this way. It's truly a disruptive innovation.”

Ihab Hourani, CTO, Axino Solutions

LoRaWAN® FOR IoT: THE PERFECT CHOICE

Axino leveraged Semtech's LoRa devices and the LoRaWAN open protocol for its Axino.IoT.FoodSafety temperature monitoring and asset quality management solution.

For the first time, grocery retailers are able to remotely and non-invasively monitor the product temperature of perishable food in refrigerated equipment. By implementing Axino's connected temperature monitoring solution with LoRa-enabled low-cost sensors, gateways and LoRaWAN-based connectivity, grocers can improve the safety and security of fresh food while reducing food waste and lost revenues.

“LoRa-based devices were the perfect choice. They offer low energy consumption, built-in security functionality, low implementation and operating costs, suitability for battery-operated sensors, and reliable public and private network performance.”

Ihab Hourani, CTO, Axino Solutions

Using LoRa chipsets, Axino's solution (comprised of custom software, hardware and a back-end system) provides easy-to-understand, real-time and historical temperature data on a web-based dashboard or mobile device. The visual display includes interactive charts and customized mapping of sensor locations. Alert notifications are built into the system to send warnings when sets of pre-defined temperature rules or thresholds are exceeded.

MIGROS DEPLOYS IoT TEMPERATURE MONITORING

Migros is Switzerland's largest retail company with annual sales over \$28 billion. Migros is owned by its more than 2 million cooperative members – an impressive share of Switzerland's 7.2 million population.

Like the majority of supermarkets in the world, Migros grocery retailers and restaurants are operated with cooling and freezing units acquired from multiple manufacturers. Axino's patented retrofit and vendor-agnostic temperature monitoring system works across all cooling systems operating throughout Europe.

Migros initially implemented the Axino.IoT.FoodSafety quality management system in stores within the Zurich region. Each Migros store involved in the initial proof of concept deployed, on average, 70 to 100 sensors – one magnet-attached sensor for each cooling unit – and a single gateway providing connectivity for the entire retail facility.

“Not only does our solution guarantee fresher food, but employees are able to spend more time taking care of other tasks. If it takes someone even one hour per day to manually record temperature readings, and you multiply that by hundreds of stores, the savings start to add up fast. Migros is projected to have ROI within less than 12 months.”

Ihab Hourani, CTO, Axino Solutions

Migros' staff were able to remotely access and review temperature developments from a smart phone, tablet or computer. The plug and play solution reduced staff workload, allowing employees to focus on managing inventory and other responsibilities. Axino's solution also enhanced Migros' quality assurance capabilities and Hazard Analysis and Critical Control Point (HACCP) processes. Based on these successful results, Migros plans to implement the Axino.IoT.FoodSafety solution in more than 800 stores by 2020.

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Semtech's LoRa devices a widely adopted long-range, low-power solution for IoT that gives telecom companies, IoT application makers and system integrators the feature set necessary to deploy interoperable IoT networks, gateways, sensors, module products, and IoT services worldwide. IoT networks based on the LoRaWAN® specification have been deployed in over 100 countries and Semtech is a founding member of the LoRa Alliance®, the fastest growing IoT Alliance for LPWAN applications.



Semtech Corporation is a leading supplier of high performance analog, mixed-signal semiconductors and advanced algorithms for high-end consumer, enterprise computing, communications, and industrial equipment. Semtech, publicly traded since 1967, is listed on the Global Select Market under the symbol SMTC and has more than 32 sales and application support offices in 14 countries as well as representatives and distribution support locations in more than 30 countries. Semtech is dedicated to providing proprietary platforms, differentiated by innovation, size, efficiency, performance, and reach.



The LoRa Alliance is an open, nonprofit association that has become one of the largest and fastest-growing alliances in the technology sector since its inception in 2015. Its members closely collaborate and share experiences to promote the LoRaWAN protocol as the leading open global standard for secure, carrier-grade IoT LPWAN connectivity. With the technical flexibility to address a broad range of IoT applications, both static and mobile, and a certification program to guarantee interoperability, the LoRaWAN protocol has already been deployed by major mobile network operators globally and connectivity is available in over 100 countries, with continuing expansion ongoing.