



# THE UNBREAKABLE CHAIN: A LOOK AT UNINTERRUPTED COLD CHAIN MANAGEMENT AT HYPERMARKET SCALE

By Advantech®

Supply Chain intelligence for cold chain quality assurance must evolve to form an unbroken chain of monitoring and traceability from the supplier's dock to the store floor. To ensure the quality of frozen and refrigerated foods, an international hypermarket chain in Taiwan required a Cold Chain Management Solution with launch timing set for early 2018. By utilizing LoRa® wireless cold chain sensors, the company was able to build a wireless neuro-network so that all frozen and refrigerated products—whether on sale, in the warehouse, or along its chain of logistics centers—can be monitored by tracking temperature and humidity changes in all freezers or refrigerators, and could be controlled via a cloud platform. This integration met a key objective to remain in

compliance with the county administration's food supply chain requirements to protect from the risk of spoilage due to fluctuations in temperature.

## Complete Cold-Chain Monitoring System from Transportation to Food Storage

Problems with cold chain distribution and storage around the world have led to many food safety incidents, raising both public awareness on the issues and spurring retailer demand for higher levels of food safety.

In the past, most retailers only paid attention to

temperature control during transportation to avoid losses. With mounting mandates for customer safety in light of publicized incidents of spoiled or contaminated food, the scope of control has been expanded to warehouses and stores to ensure that frozen and refrigerated foods at every part of the supply chain are stored at the appropriate temperature, thus ensuring product freshness.

The hypermarket contacted Advantech for the selection of LoRa wireless cold chain sensors to enable management to monitor the temperature in the freezers and refrigerators at every stage of the supply chain. The hypermarket has also provided LoRa wireless sensors to its suppliers in order to better monitor fresh food products, requesting them to install the sensors in their freezer containers. Per the project specification, the input from these sources could be accessed from the company's IT management layer applications during transportation, thus ensuring end to end monitoring and management of the goods.

In addition, the hypermarket outfitted its employees with handhelds suitable for efficient

temperature scanning and data transmissions in accordance with next-gen supply chain optimization.

With the updated handheld PCs, the company's dock and warehouse employees can handle receipt, cross-dock, putaway, pick, replenishment, packing, dispatch, stock taking, and more. This information is derived from a variety of data sources, including barcode, RFID, and the LoRa sensors, all posting back to the management layer in real-time.

### Benefits of Cold Chain Management Solutions

#### *Regulatory Compliance, Efficiency, and Reduced Costs*

The process improvements were a significant departure from past practices in food safety management, which involved intensive employee resources. Staff would randomly select a batch of refrigerated or frozen products, check the temperature with a sensor, record the reading on paper, and then return to the office and input the data at a computer workstation. The



*Wireless sensors based on LoRa technology assure cold chain goods compliance with minimal deployment time. Identical LoRa sensors track goods along the supply chain, for continuous end to end monitoring*

shortcomings of this method were many. First, human error is inevitable in manual records; second, paper records are relatively easier to lose. Since current regulations governing food safety and sanitation require relevant and accurate documents to be preserved for 5 years, data management has become a crucial concern for food safety management. Entries in paper records are also easy to fake by unscrupulous employees, compromising the quality of the entire effort. Thus, in-tune of expanding Supply Chain technology trends and future requirements forecasted for the industry, the system improvements helped to realize a 10% boost in operational time efficiency.

This efficiency extends to the store floor. Today, whenever there is an abnormality in the temperature of any freezer or refrigerator, the cloud platform will notify management immediately so that any problem can be identified, rectified, and prevented from occurring again in the future. In addition to the enhancement of food safety control for improved regulatory compliance and improved supply chain efficiency, the hypermarket also experienced lowered electricity costs.

### Uninterrupted End-to-End Monitoring Optimizes Temperature Adherence

Automatic Identification and Data Capture (AIDC) plays a huge role at the hypermarket's dock and warehouse locations. AIDC is the functionality of a recognition system to be able to both automatically identify objects and encode meaningful data about it for the computer or data record. For the hypermarket's AIDC solution, a reliable data handheld platform was essential to obtain the end-to-end supply chain visibility that's essential for just-in-time replenishment of inventory. A notable feature about Advantech's [PWS-472](#) industrial-grade handheld terminal is that it supports IR temperature input, which is

particularly relevant for cold chain retailers such as this one. Additionally, the device is based on the Android OS, making system integration to their application providers easy, and significantly



*This handheld can obtain temperature readings of goods using an easy aim and shoot method. Also, mobile workers can scan barcodes, take pictures or get temperature readings from the same unit.*

improved deployment efficiency. Since the integration of the cold chain solution, staff can install LoRa wireless cold chain sensors among refrigerated products, use the [PWS-472](#) handheld to scan bins, confirm products to be inspected, and use the handheld's infrared (IR) laser scan to check the temperature of any item not already monitored by the [TREK-120](#) LoRa sensor network. As the data is automatically uploaded to the cloud, the refinement not only saves staff time but also ensures compliance with data preservation regulations.

To establish a wireless network, the Advantech [TREK-120](#) LoRa wireless cold chain sensor can be installed in store freezers and refrigerators in a matter of seconds. This is a sharp contrast to traditional wired sensors that require the costly installation of cabling. Once attached and networked, the [TREK-120](#) can simultaneously measure food temperature, humidity, and vibration levels. Although the functionality of the

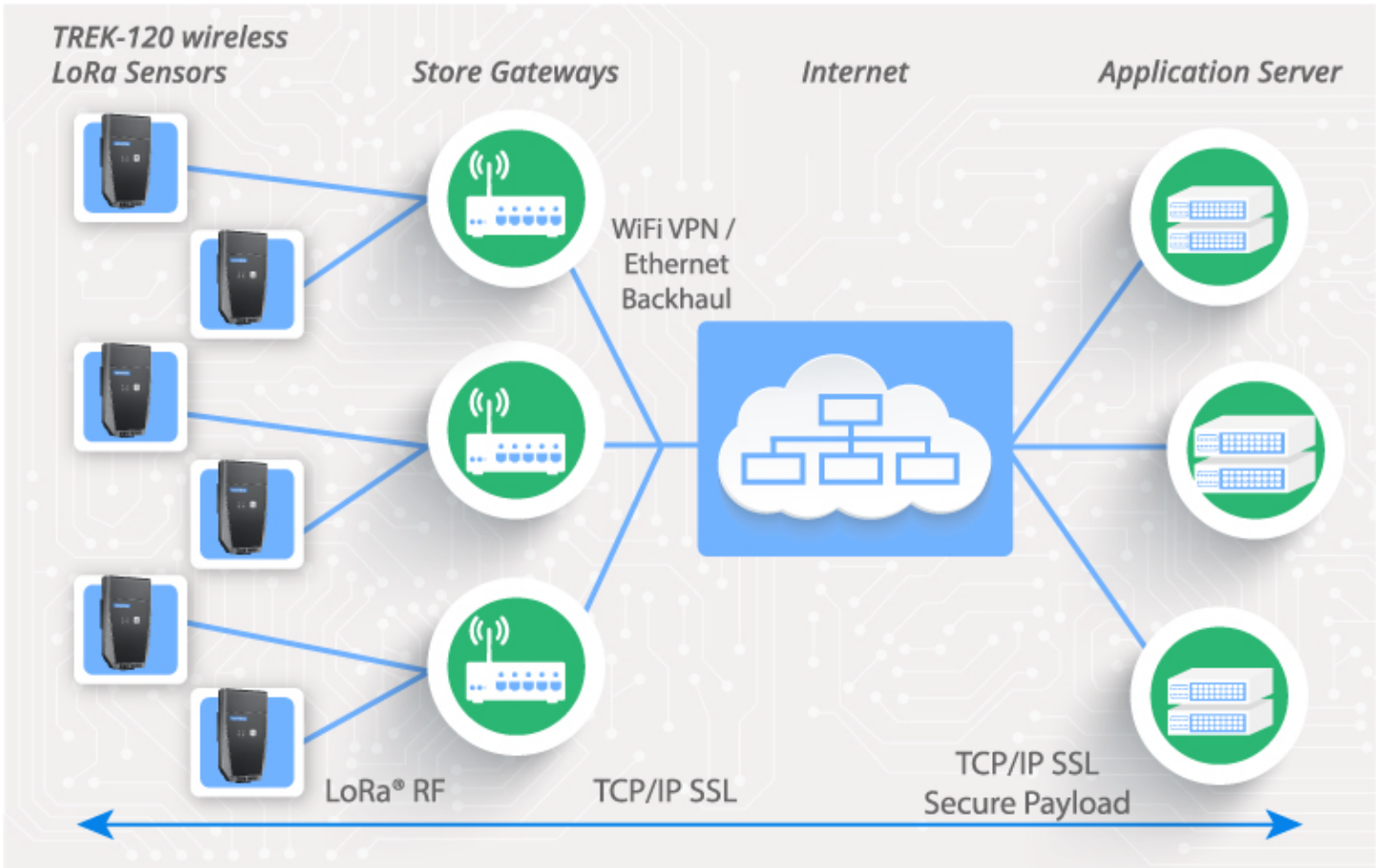
TREK-120 is relatively similar to other general sensors in terms of items to be measured, the TREK-120 can perform data transmission over long distances with low power consumption.

While traditional sensors use Wi-Fi or Bluetooth® for data transmission, the biggest drawback of these wireless network types is their large power consumption, the TREK-120 relies on LoRa technology's low-power connectivity and thus the battery can last for several years. With its ease in setup of private networks, LoRa technology is also secure, while the Bluetooth technology is vulnerable to outside interference, making it unsuitable for cold chain food safety monitoring.

Because LoRa operates mainly in the global free-to-air frequency band, it can easily overlap

communication frequency bands already used by the customer, causing mutual interference between signals. The hypermarket encountered this problem while installing the Advantech Cold Chain Management Solution, and Advantech engineers immediately assisted with adjusting the operating frequency band. Additionally, the system was set up so that the sensors would first inquire whether there is any signal occupying the channel before transmitting data, which further assured the transmission quality.

With the recent high-profile emphasis on food safety, a reliable, uninterrupted solution for complete cold chain management can help retailers ensure food safety and secure a brand position in the marketplace to give their customers peace of mind while shopping. Since the



*With its long range, low power and low cost connectivity benefits, LoRa is a favorable network technology for cold chain monitoring solutions, as it has become for Internet of Things developers*

hypermarket introduced Advantech's Cold Chain Management Solution, their practices for monitoring frozen/refrigerated food product safety have fallen in line with global trends, and have raised the quality of service and experience for the store patrons.

If you have projects this year for supply chain and transportation management system integration to enable new ideas and discover new economies in delivery services, see more details on Advantech iLogistics Solutions.

### 10%+ Increase in Productivity & Cost Efficiency

- Rugged Industrial-Grade Design for harsh warehouse operation
- LoRa networking for goods monitoring
- WiFi and 4G LTE for real-time connectivity to the Cloud



#### Wireless Cold Chain Temperature / Humidity Sensor

Wireless data transmissions via NFC and LoRa technology.

TREK-120

### 5" Industrial-Grade Handheld Terminal

Supports Windows® 10 & Android, with 4G LTE, WiFi, Onboard 1D/2D barcode scanner and RFID options

PWS-472



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