

# Electronic Shelf Labels: Scale & Security for Smart Retail

RIGADO

## The Electronic Shelf Labels (ESL) Market Opportunity

Most major retailers, in particular grocers and large national chains, are deploying or planning to deploy ESLs in the next 12-18 months. The labor and opportunity costs of manually printing and updating thousands of price stickers represents a major savings opportunity, and the latest generation of electronic shelf labels is making deployment and management more feasible. SES Imagotag cites an **80% reduction in time spent updating prices** and a **2-5% increase in sales** when using ESLs. According to multiple research firms, the global market for ESLs is expected to grow above \$3B, with a CAGR of 15-18%, by 2030.



## Current Technology & Approach

Most first-generation ESLs tend to rely on infrared (IR) technology or custom RF protocols. There are several drawbacks to these implementations, notably:

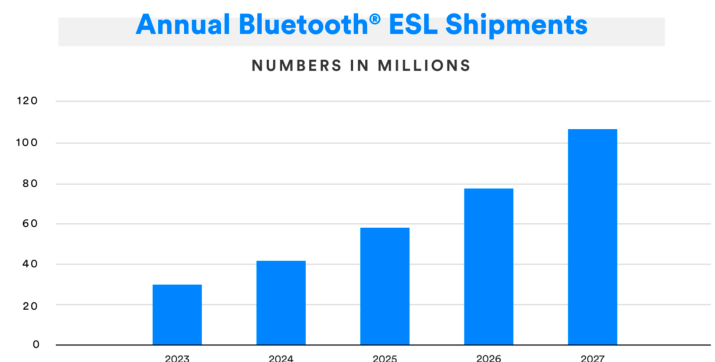
- They require proprietary network hardware and often a hand-held device to connect and update the ESLs
- The ESLs can easily be hacked and tampered with
- Updating is slow (sometimes 30-60 seconds per ESL)
- Monitoring the battery life and health of the ESL is challenging

These challenges have slowed the deployment and adoption of ESLs, but the new Bluetooth® 5.4 specification combined with Rigado's Unified Edge Network approach makes it possible for retailers to securely **implement an ESL program quickly and cost-effectively.**

## Bluetooth®: The Most Scalable Shelf Label Connectivity Option

Features & benefits of next-gen shelf labels utilizing BLE 5.4:

- **Bluetooth® ESL is the only global standard for multi-vendor ESL interoperability**
- Bluetooth is available on many existing WiFi access points, making it possible to deploy ESLs without installing a completely new network
- BLE allows for use cases beyond ESLs, **increasing the value of the network beyond ESLs**



Data Source: ABI Research, 2023



BLE is the leading choice for new ESL deployments, but **retailers still need to consider the best approach for rolling out this new technology across the network**

## A Unified Edge Network for Shelf Labels and Sensors

By adding Rigado Edge Connect software to existing store networks, retailers can connect thousands of ESLs as well as other wireless sensors. No proprietary networks or costly installs, and Edge Connect ensures the security and scale for thousands or millions of devices across an entire chain.

### Typical Electronic Shelf Label Architecture

BLE 5.4-enabled access points & gateways provide store-wide coverage for ESLs



Rigado Edge Connect allows multiple ESL & sensor types to simultaneously connect to the Enterprise network



Customer uses cloud software to update ESLs



Rigado Edge Direct monitors ESL health and battery status



### Common ESL Questions

#### How many ESLs can connect thru a typical gateway or WiFi access point (AP)?

Most Bluetooth gateways and WiFi APs can connect hundreds or thousands of ESLs, and the limiting factor will be the range of the devices (see below), or the number of simultaneous connections supported by the gateway/AP. To account for this, most ESL management platforms will queue the updates for the ESLs and process them in a staggered manner.

#### What is the range of a BLE shelf label? Does it require repeaters?

In a typical retail environment, an ESL can reliably connect within 100 feet of the nearest gateway or AP, similar to a WiFi client. This will vary based on store construction and ESL hardware, and in cases where additional range is needed, customers can deploy additional gateways to add coverage.

#### How long does it take to update an entire store with new prices?

This also varies depending on how many simultaneous connections the gateway/AP supports, bandwidth of the BLE connection, and the ESL hardware. A single ESL can take 20-30 seconds to update, and a good rule of thumb is that 1,000 shelf labels will take about 10 minutes to update with new prices.

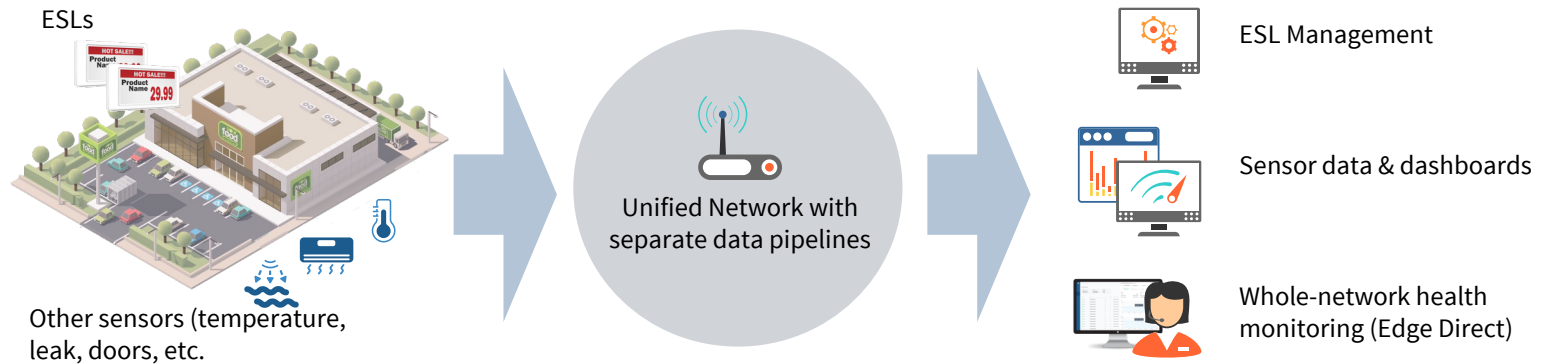
#### How does Bluetooth ensure security and prevent the shelf labels from being compromised?

Each shelf label has a secure connection between it and the nearest access point or gateway, which is analogous to having a secure Bluetooth connection to an audio device. But in this case, there is no way to manually put the ESL into a pairing mode which would allow someone to maliciously take over the device. Only the cloud application (via the gateway) can communicate with the ESL and make any updates to prices or other display elements.

## Add Other Sensors to the Same Network

Here we see another benefit of using Bluetooth Low Energy for the ESL network: the ability to add other sensor-based use cases on the same network. With Edge Connect, separate pipelines are added to connect sensors and send their data to different destinations, for example to monitor temperature or assets. Sensors can come from different solution providers and utilize multiple cloud endpoints. And from Edge Direct, different users will have access to only the sensors they are allowed to manage.

### Combined Edge ESL & Sensor Network



### What Is the Role of Edge Direct?

Rigado Edge Direct allows IT to monitor and manage the health and configuration of this combined network in a similar way to the WiFi data network. Some key features include:

- Realtime and historical views of Edge hardware performance
- Organize and track hardware across locations and regions
- Scheduling & deploying updates to devices with maintenance windows at scale

Edge Direct comes with an open API and is InfoSec qualified in many large Enterprises already, making it easy for IT managers to quickly approve and deploy it alongside their existing network management tools.

## Summary

For retailers looking to test & compare hardware options, and ultimately deploy electronic shelf label solutions into their stores, **Bluetooth 5.4 brings several advantages:**

- Flexibility of ESL hardware
- Reliability & Scale
- Lower cost

Furthermore, when deploying BLE-based devices, a **unified network approach** that can enable other sensor-based use cases can dramatically improve the ROI of the solution while making it easier to support.



Interested in more information? Connect with us at [contact@Rigado.com](mailto:contact@Rigado.com)