TEMPERATURE TRACKING WITH BLE SENSORS

INTRO

The temperature tracking and monitoring industry has a multi-billion-dollar economic and environmental impact worldwide. It is constantly changing and adapting to growing consumer demands. But to remain competitive and profitable, cold chain logistics fleets have to look for innovative and efficient solutions. Bluetooth® technology, combined with vehicle GPS trackers and sensors, opens up new possibilities for fleet and cargo monitoring.

CHALLENGE

Did you know, according to the International Institute of Refrigeration, the lack of a functioning cold chain causes considerable food loss - up to almost 20% throughout the world? Going further, in developed countries, food losses account for nearly 9% of total food production, and 23% on average in developing countries.

Meat, poultry, dairy products, seafood, agricultural produce, various chemicals and pharmaceuticals, flowers, and many other daily consumed goods require temperature monitoring during transportation to ensure that they are delivered to end-users in usable condition.

Broken cold chains within specified environmental conditions caused by mechanical breakdowns of transporting vehicles, traffic delays, custom border checks, driver confusion abroad, poor loading practices, inadequate insulation, and similar factors create unwanted temperature fluctuations that may affect spoilage and the safety of perishable cargo. Furthermore, a lack of real-time visibility of goods locations and their status, or even thefts, can be a contributing factor to inefficient business operations and significant losses.

Unquestionably, temperature (and humidity most times) monitoring is critical for the logistics industry in any country around the world. Sometimes, they are crucial to health and safety, in others - to the preservation of

priceless items, such as antiques and artefacts. Luckily, these challenges can be effectively tackled with minimum effort and maximum results by utilising Teltonika Telematics wide range of product portfolio, smart features, and wireless Bluetooth® technology.

SOLUTION
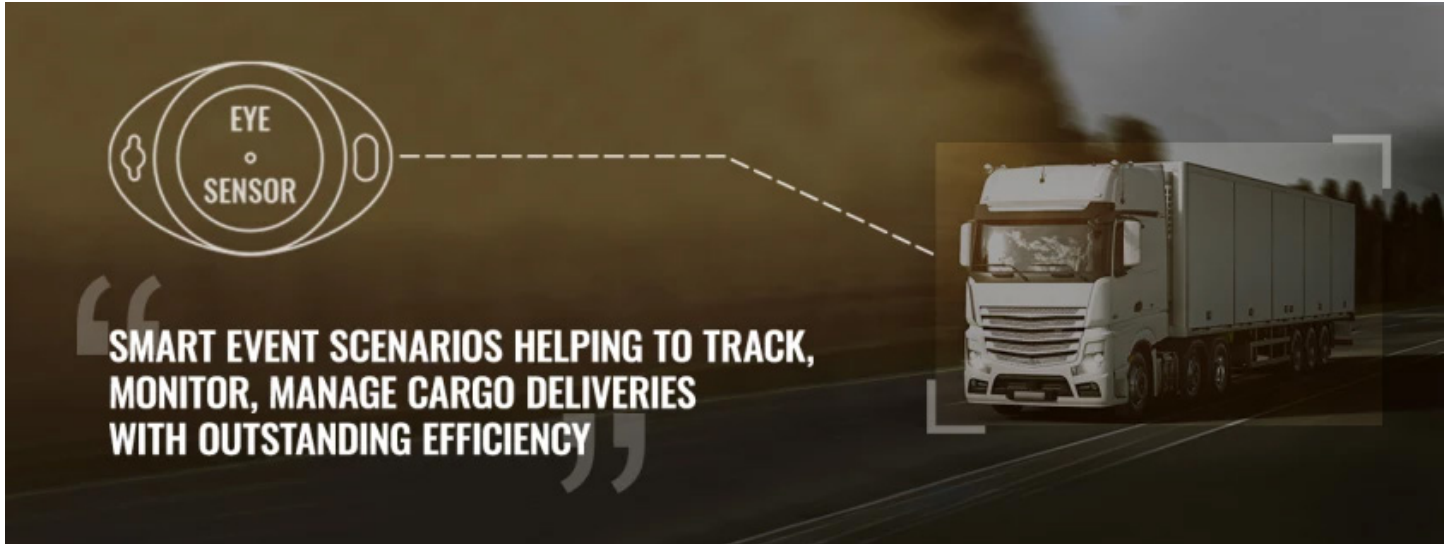
To solve the challenges mentioned above, we use the CAN DATA category GPS tracker FMB140 with integrated CAN bus data reading processor and EYE Sensor - the Bluetooth® LE-based Teltonika device with smart features and extensive functionality set including ID signal transmission, temperature, humidity, etc.

How it works - the FMB140 model is based on the FMB platform and supports wireless Bluetooth® LE connectivity, so it can effectively communicate with Bluetooth® devices such as sensors. To ensure the best results, the tracker should be installed in a cold chain vehicle and configured the usual way in a spot where its Bluetooth® antenna is not covered by bulky metal parts nearby.

The compact and lightweight EYE Sensor has to be attached to temperature-sensitive cargo items to be tracked and monitored - the protective bag, outer corrugated carton, container, barrel, pallet, etc. The vehicle GPS tracker receives readings from each sensor over the air at configurable intervals and sends this data as an iBeacon or Eddystone profile to a server for analysis combined with the actual temperature, humidity, and GNSS location details.

Dedicated software developed by a telematics service provider determines and displays the location of all EYE Sensors (i.e. tagged items) based on their proximity to the vehicle tracker and the parameters they track. As a result, the load of the cold chain truck can be monitored in real-time via PC, laptop, or smartphone, significantly improving the efficiency of goods management and logistics operations and preventing loss or theft. But we do not stop there...

VALUE-ADDING SMART FEATURES

To bring maximum value, the EYE Sensor model has a set of handy FM firmware features and event scenarios helping to sort, monitor, manage, and optimise operations of cold chain logistics with remarkable efficiency. Let's look at some prominent ones.

Based on project requirements, you can set a meaningful temperature range for each sensor (parameters 'Low Level' and 'High Level' shown in the image below). If the actual temperature of the item goes outside the pre-

defined range, the FMB140 device will generate the event accordingly and send the relevant data to the dedicated server to inform the persons in charge. It allows to take appropriate action without delay and prevent negative consequences.

IO elements

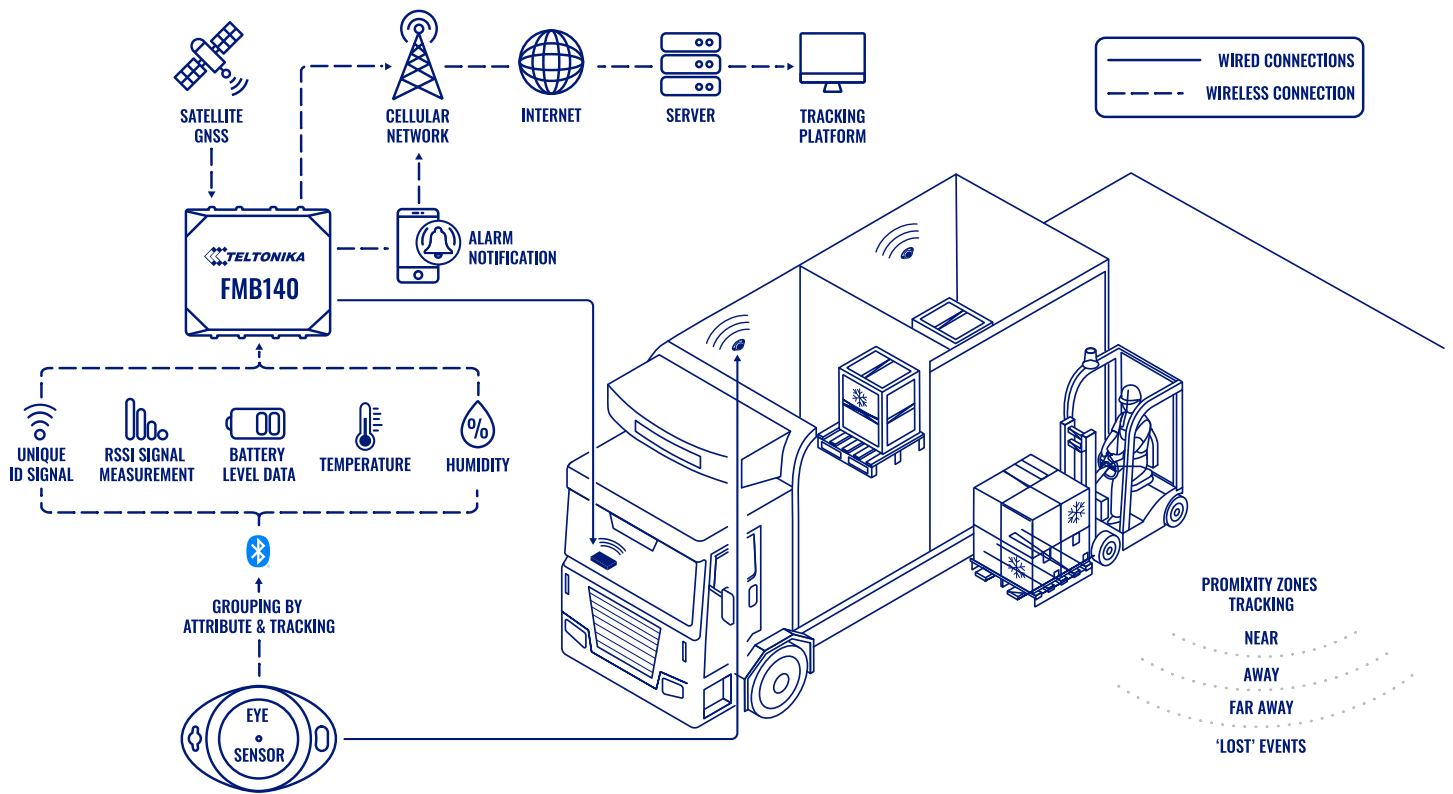| Input Name	Units	Priority				Low Level	High Level	Event Only		Operand	Send SMS To	SMS Text
Temperature	°C	None	Low	High	Panic	-1	7	Yes	No	On Exit ⌄	⌄	Temperature 4
Humidity	%	None	Low	High	Panic	0	0	Yes	No	Monitoring ⌄	⌄	Humidity 4
Magnet		None	Low	High	Panic	0	0	Yes	No	Monitoring ⌄	⌄	Magnet 4
Movement		None	Low	High	Panic	0	0	Yes	No	Monitoring ⌄	⌄	Movement 4
Angle		None	Low	High	Panic	0	0	Yes	No	Monitoring ⌄	⌄	Angle 4
Low Battery		None	Low	High	Panic	0	0	Yes	No	Monitoring ⌄	⌄	Low Battery 4
Battery Voltage	mV	None	Low	High	Panic	0	0	Yes	No	Monitoring ⌄	⌄	Battery Voltage 3

Going further, there are two ways, how to add and set up EYE Sensors in Teltonika Configurator. The first one - the commonly used method of adding the MAC address of each sensor allowing it to support up to 4 of them at a time per GPS tracker. The second one is the more innovative and appealing method of adding EYE Sensors only 'By Name'. Here, the vehicle tracker will gather data from each sensor based on its name, not MAC address.

As a result, there is no need to reconfigure MAC addresses again in Teltonika GPS tracker if sensors (or cold chain trailers with sensors) have been changed. It is sufficient to just type in the names respectively using the configurator tool, this way saving precious time and avoiding mistakes. Even more, the method supports up to 100 pieces of EYE Sensors at a time, which makes a significant difference.

Lastly, the 'Signal Level' parameter (so, its strength and transmitting range) of the accessory model can be configured individually. This makes it possible to gather data only from sensors that are nearby, ignoring information from sensors that are far away. Such a feature allows grouping cold chain items of interest in ways meaningful and helpful to business operations.

In closing, the newly launched Teltonika EYE Sensor, together with the FMB140 tracker, offers an unmatched feature combo to ensure effective cargo tracking, distribution, and corporate fleet management. For greater convenience and practicality, firmware updates and configuration changes of Teltonika vehicle trackers can be swiftly made using the recently renewed FOTA WEB tool - the software solution, helping to save precious time and manage GPS devices remotely with maximum efficiency. This altogether will result in noticeable cold chain project profitability, improved business reputation, competitiveness, and investment return.

TOPOLOGY

SATELLITE GNSS

CELLULAR NETWORK

INTERNET

SERVER

TRACKING PLATFORM

WIRED CONNECTIONS

WIRELESS CONNECTION

FMB140

ALARM NOTIFICATION

UNIQUE ID SIGNAL

RSSI SIGNAL MEASUREMENT

BATTERY LEVEL DATA

TEMPERATURE

HUMIDITY

GROUPING BY ATTRIBUTE & TRACKING

EYE SENSOR

PROMIXITY ZONES TRACKING

NEAR

AWAY

FAR AWAY

'LOST' EVENTS

BENEFITS

- **EYE Sensor settings are customisable for every project** - to get the maximum value out of it, Teltonika EYE Sensor signal strength and data transmitting intervals can be configured to exact project application needs and used, practically, in any form and size buildings, vehicles or trailers.

- **Precise cargo temperature and location monitoring** - 100% accountability of everything important to the cold chain logistics - goods, fresh produce, valuable assets, processes, patterns, and staff actions of interest are being tracked, monitored, and optimised.

- **Unique and value-adding FM firmware features** - abundant smart and practical event scenarios helping to track, monitor, and manage cargo deliveries with outstanding efficiency.

- **Wireless and affordable** - Bluetooth® connectivity is cost-efficient, while ensuring fast installation and setup, low interference, and economical power consumption. If damaged, lost or stolen, Teltonika EYE Sensor can be quickly replaced.

- **Improved profitability and competitiveness** - considerable cost savings because of cutting goods, valuable asset loss expenses, anti-theft protection to boost profits, improved cash flow, and investment opportunities.

WHY TELTONIKA?

In today's competitive logistics landscape, efficient cold chain management is critical to success. Teltonika EYE Sensor goes beyond traditional temperature monitoring to provide a future-proof approach. Our modern technology integrates seamlessly with your existing systems, providing real-time data, actionable insights and powerful automation capabilities.

Teltonika Telematics is your innovation partner. We understand the evolving needs of the cold chain industry and continually develop solutions to meet them. Our scalable platform adapts to your specific needs, offering flexibility and customisation to ensure your operations remain at the forefront of efficiency. Choose us and unlock a world of data-driven insight, proactive risk management and optimised cold chain logistics that will drive your business to sustainable success.

FEATURED PRODUCT

FMB140

RELATED PRODUCTS

FMB150, FMC150, FMM150, FMB240

RELATED ACCESSORIES

EYE Sensor