

**USE CASES // ASSETS & WORKFORCE** 

# **INDOOR TRACKING SOLUTIONS**

# **INTRO**

To compete effectively in today's fast-paced world and rapidly evolving technologies, businesses must be more innovative, efficient and competitive, while saving resources. As a result, affordable indoor tracking solutions combined with process monitoring and automation options are becoming increasingly popular, providing an opportunity for those looking for new market niches to profit.

# **CHALLENGE**

Let's get it straight - why would companies and organisations even need a positioning system indoors? Well, within sizable buildings such as warehouses, shopping malls and supermarkets, trade fairs, exhibition centres, airports, hospitals, complex public transport hubs, concert halls and sports arenas, managers and team leaders may spend a considerable amount of time managing and finding in a real-time what they are looking and accountable for - people, goods, and assets.

Re-organising and optimising these tedious daily routines through the use of modern technology would undoubtedly save companies resources, effort and time, improving customer service and ROI, to say the least. In addition, with dedicated third-party software, companies can get a real-time overview of all registered assets on the site map, take advantage of search and filter functions, motion profiles, time-lapse changes, convenient asset/ person registration and management routines, tracked object dashboards, and more.

Since it became publicly available in the late 90s, the **Global Positioning System (GPS)** satellite technology revolutionised outdoor positioning. Today billions of people worldwide have at least one smart device with such positioning capabilities - a smartphone, tablet, or watch with built-in GPS or tracking device. But there is a major

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technical difficulty here - GPS signals often are **not accurate enough** to be practical indoors or in narrow streets as they diminish and scatter by surrounding structures - roofs and walls. Even more, the location error range of some GPS chips can be greater than the indoor space itself.

So, is there any way to overcome this obstacle and rip the benefits of location tracking and positioning indoors to ensure accurate indoor tracking where GNSS struggles?

# **SOLUTION**



Thanks to the fast-developing and competing technologies, indoor tracking can be achieved in a variety of ways by adopting Bluetooth® Low Energy 4.X (BLE), Wi-Fi, Magnetic Field Detection, Near Field Communication (NFC), Ultrawideband (UWB), Radio-frequency Identification (UHF RFID), etc. They vary in terms of cost efficiency, accuracy, compatibility, and implementation effort, but we discuss further indoor positioning, tracking and navigation use cases specifically for Bluetooth<sup>®</sup> GPS trackers in a combination with BLE beacons, small ID radio transmitters. And here is why...

**Bluetooth® connectivity** has low cost, high energy efficiency and accuracy, works independently of the network and has less interference, easy to install, deploy and integrate into the existing Bluetooth<sup>®</sup> ecosystem. Beacons with configurable to exact customer need signal strength and data transmitting intervals can be easily integrated into virtually any size and form environment.

ID beacons continue to transmit unique signals, which GPS trackers read and identify. The FM devices then send this data, along with their GNSS location details, to a server for analysis. Dedicated software determines the location of all beacons (i.e. tagged assets and/or people) based on their proximity to the nearest tracker.

Also, ID beacons can be fixed in specific places indoors and used as a **unique location identifier**. When a vehicle equipped with an FM tracker enters a BLE beacon transmitting zone and reads its ID signal, vehicle location gets tracked with pretty high accuracy. If a vehicle operates both outdoors and indoors, it will be tracked via GNSS signal outside and via ID beacons inside.

Another scenario - FM device is permanently fixed on-premise walls, ceiling, and racks, plugged into a power supply unit and it is used as a **gateway** between moving beacons and a cellular network. This is not a conventional way to utilise GPS trackers, but it also proved to be beneficial and has a demand in the market.

Teltonika GPS trackers support up to 100 beacons simultaneously, and each beacon will work continuously for approximately 2 to 10 years on a single battery, depending on the model, transmitting a signal up to a range of 500 metres. By using Bluetooth<sup>®</sup> Low Energy 4.X technology products and accessories, companies and organisations can

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track indoor items, employees, customers, mobile tools, vehicles, object/person movement patterns and more. The possibilities and benefits are remarkable, so let's go through some of the prominent use cases.

# **INDOOR GOODS, WORKFORCE, AND VEHICLES TRACKING IN WAREHOUSES**



This scenario ensures indoor positioning in busy large warehouses, tracking goods (individual or pallets/containers/ canisters), vehicles (e.g. forklifts, pallet trucks, order pickers, tugs) and employees in real-time, providing a comprehensive analysis of operations, anti-theft protection, accident prevention and indoor navigation. In addition, the solution can be easily supplemented with Bluetooth<sup>®</sup> LE sensors, such as temperature and/or humidity sensors, to create the right conditions to prevent damage to goods, products, the facility itself and avoid financial losses.

Here, FM trackers are installed in industrial vehicles (e.g. forklifts) and ID beacons are stationary, either mounted on racks, walls or ceilings. Their position is known and used for indoor positioning when a forklift enters each beacon's signal transmission zone.

The key benefits are all important in optimising business processes, minimising search and loading times, downtime, operating costs, increased efficiency, space utilisation, worker safety and return on investment. This outline applies perfectly to many industrial sites and the logistics industry.

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#### WORKERS, MACHINERY, AND VEHICLES TRACKING IN MINING



When Teltonika GSM trackers are installed in combination with ID beacons/sensors, business owners and fleet management can benefit from real-time asset, vehicle and personnel tracking; comprehensive anti-theft protection; analysis of movement profiles, staffing, workflow and deployment efficiency; monitoring of specific workstations or entire sites (e.g. temperature, humidity); securing of hazardous areas, monitoring of emergencies and management of evacuation procedures. All of the above apply to open-cast mines, underground mines, remote sites and the gas and oil industries.

Similar to the previous scenario above, FM devices are installed in industrial mining vehicles (dump trucks, excavators, various loaders, bulldozers, motor graders, etc.), and Bluetooth<sup>®</sup> beacons are stationary and attached to either reinforcement frames or shaft ceilings. Their position is known and used for indoor positioning when tracked mining machines enter each beacon signal transmission zone.

The main benefits are maximised productivity and profitability, greatly improved worker safety and discipline, optimised workflow, asset utilisation, preventive maintenance procedures for machinery and heavy vehicles, reduced downtime, wasted company resources, etc.



## PERSONNEL, ASSETS, AND VEHICLES TRACKING IN MEDICAL EMERGENCY SERVICES



By using a combination of FM devices and Bluetooth<sup>®</sup> ID beacons, fleet managers can significantly benefit from tracking ambulance vehicles and onboard assets. Here, Teltonika GPS devices installed in vehicles track the real-time location of ambulances and, at the same time, all objects with beacons attached.

In this way, indoor tracking of ambulance crew members, high-value medical equipment and machinery, expensive drugs, medicine location monitoring and, if necessary, their temperature tracking by adding Bluetooth<sup>®</sup> LE temperature sensors.

The key benefits are optimisation of ambulance fleet routines and far greater efficiency, theft protection and increased accountability for medical equipment, drugs and related inventory, improved team communication and readiness, improved dispatch and response times, timely fleet maintenance and reduced operational costs.



# TOPOLOGY



# **BENEFITS**

- Smooth business operations and outstanding efficiency 100% accountability for everything that matters to the business goods, valuable assets, processes, patterns and personnel actions are tracked, monitored and optimised. Maximum results with minimum fuss.
- Impeccable customer service and brand reputation real-time visitor, customer, patient or passenger flow monitoring and navigation; location-based smartphone apps, maps and audio guidance where appropriate to improve user experience, loyalty and corporate image.
- Improved profitability and competitiveness significant cost savings from reduced goods, loss of valuable assets, theft protection; location and/or action-based marketing campaigns to increase profits, improve cash flow and investment/expansion opportunities.
- **Increased safety and reduced accidents** improved safety for staff and visitors, prevention of workplace accidents or fatalities and reduction in work-related injury costs, better coordinated evacuation procedures, etc.
- **Customisable solutions for any project** to get the most out of it, Teltonika BLE beacon signal strength and data transmission intervals can be configured to the exact needs of the project application and can be used in virtually any building shape and size.
- **Cost-effective**, **quick and easy installation** the hassle-free installation process for Bluetooth<sup>®</sup> LE wireless beacons is inexpensive, quick, and eliminates the possibility of human error. If damaged or stolen, any Teltonika beacon can be quickly replaced.



# **WHY TELTONIKA?**

At Teltonika Telematics, we understand the diverse requirements of indoor tracking across different industries. Our solutions, which integrate Bluetooth<sup>®</sup> LE technology with sophisticated GPS trackers, are designed to be customised to meet the specific needs of each customer. This adaptability makes our offerings ideal for a wide range of applications, from logistics to healthcare.

Choosing Teltonika Telematics means partnering with a company that values innovation, quality and customer satisfaction. We are committed to providing solutions that not only meet but exceed expectations, ensuring that our customers are equipped with the best tools to optimise their indoor tracking operations.

# **FEATURED PRODUCT**

FMB204

# **RELATED PRODUCTS**

FMB225, FMB230, FMC225, FMC230, FMM230, FMB202, FMB209

# **RELATED ACCESSORIES**

EYE Beacon, EYE Sensor

