

INDOOR TRACKING SOLUTIONS

INTRO

To compete effectively in the fast-paced world and swiftly developing technologies, businesses have to be more innovative, efficient, competitive, but save resources at the same time. As a result, **affordable indoor tracking solutions** combined with process monitoring and automation options are becoming more popular, and it is a window of opportunity for those looking for the 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.

Organising and optimising these tedious daily routines in a new way by utilising modern technologies undoubtedly would save company recourses, effort, and time, would improve customer service and ROI, to say at least. Furthermore, with a dedicated third-party software in place, businesses can get a real-time overview of all registered assets on the site map, take an advantage of search and filtering functions, motion profiles, time-lapse changes, convenient asset/people registration and management routines, tracked objects dashboards, etc.

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

SOLUTION

Thanks to the fast-developing and competing technologies, the indoor tracking can be achieved in a variety of ways by adopting [Bluetooth Low Energy 4.0 \(BLE\)](#), [Wi-Fi](#), Magnetic Field Detection, [Near Field Communication \(NFC\)](#), [Ultra-wideband \(UWB\)](#), [Radio-frequency Identification \(UHF RFID\)](#), etc. They vary in terms of costs efficiency, accuracy, compatibility, and implementation effort, but we discuss further indoor positioning, tracking and navigation use cases specifically for Bluetooth 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 ecosystem. Beacons with configurable to exact customer needs signal strength and data transmitting intervals can be easily integrated into virtually any size and form environment.



ID beacons keep transmitting signals unique to each of them and GPS trackers read and identify them. Afterwards, FM devices send this data, combined with its GNSS location details, to a server for analysis. Dedicated software determines all beacons (thus, tagged assets and/or people) location based on proximity to the closest tracker.

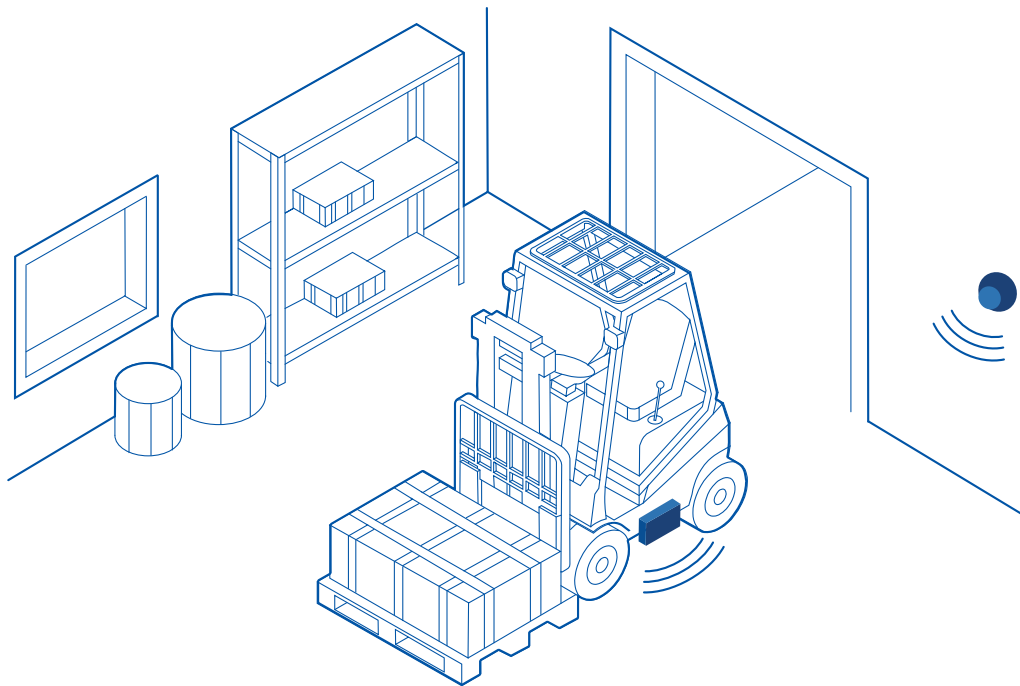
Also, ID beacons can be fixed in specific places indoors and used as a **unique location identifier**. When a vehicle equipped with FM tracker enters a BLE beacon transmitting zone and reads its ID signal, vehicle location gets tracked with pretty high accuracy. If a vehicle operates both outdoors and 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, racks, plugged to 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** at a time and each of them will continuously work, depending on the model, around 2 to 10 years on a single battery transmitting signal up to 500 m range.

By applying Bluetooth Low Energy 4.0 technology products and accessories, companies and organisations may track indoors items, staff, customers, moveable tools, vehicles, object/people movements patterns, etc. Possibilities and benefits are remarkable, so let's go through some of the prominent use cases.

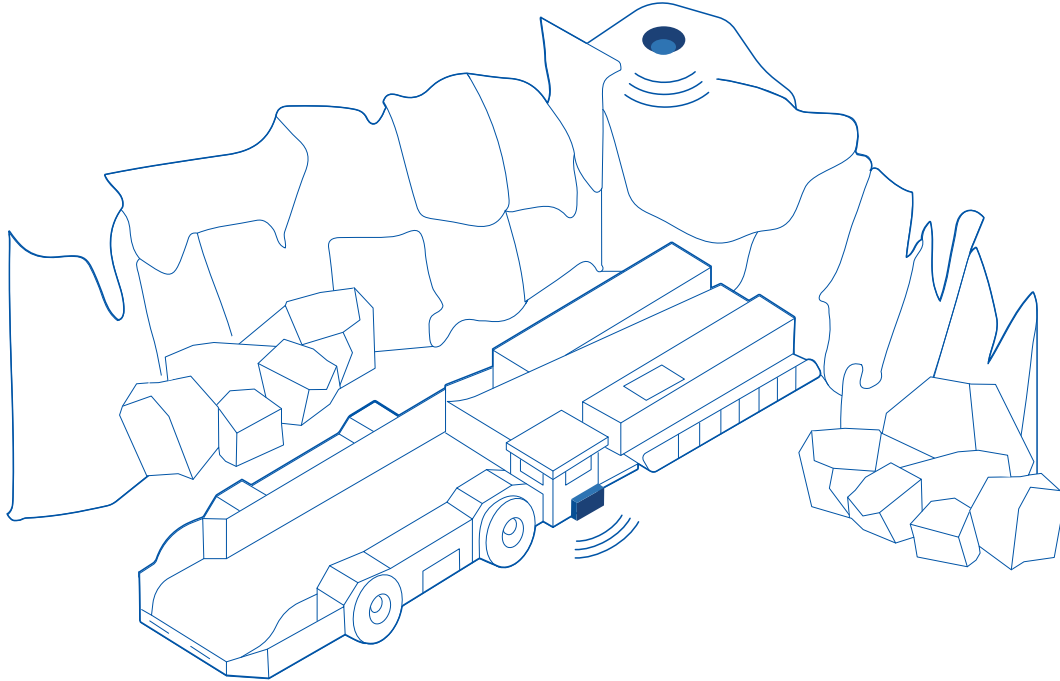
INDOOR GOODS, WORKFORCE AND VEHICLES



This scenario ensures indoor positioning in busy large-scale warehouses tracking goods (individual or pallets/containers/canisters), vehicles (e.g. forklifts, fork trucks, pallet trucks, order picking trucks, tigger trains) and employees in a real-time, comprehensive proceeding analysis, anti-theft protection, accident prevention, and indoor navigation. Furthermore, the solution can be conveniently complemented by BLE sensors such as temperature and/or humidity ones to provide the right conditions to prevent damage of goods, products, facility itself and avoid financial losses.

Here, FM trackers are installed in industrial vehicles (e.g. forklifts), and BLE beacons are stationary fixed to either racks, walls, or ceiling. Their position is known and used for indoor positioning when a forklift enters each beacon signal transmitting zone.

WORKERS, MACHINERY AND VEHICLES TRACKING IN MINING

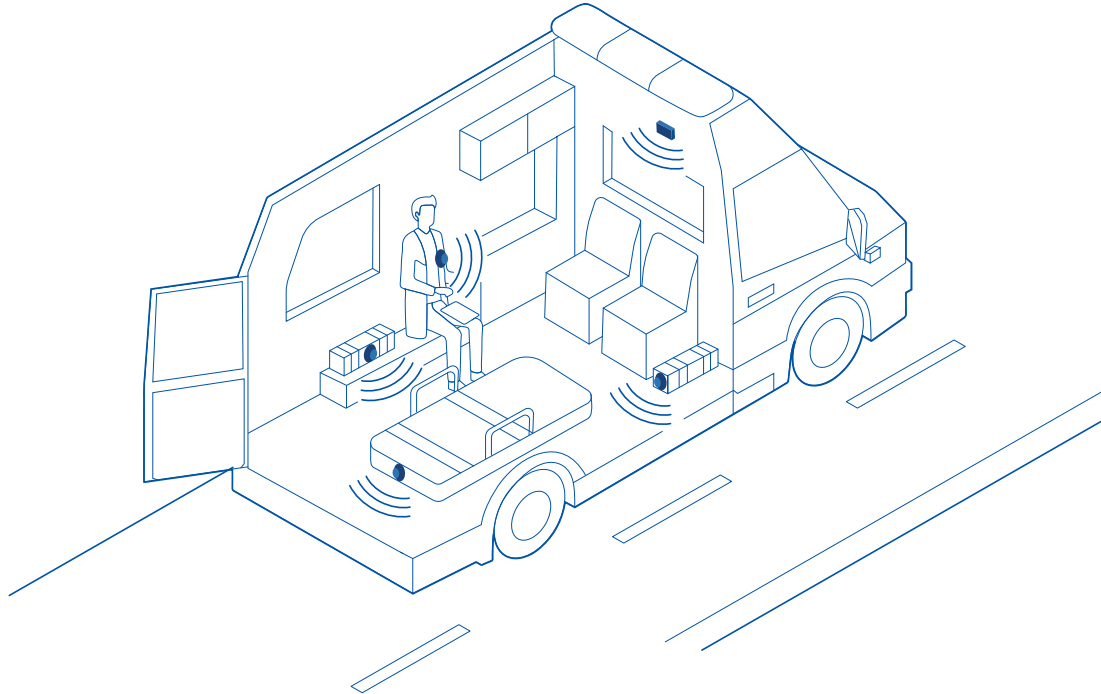


When Teltonika GSM trackers combined with ID beacons/sensors installed, company owners and fleet management may utilise real-time tracking of assets, vehicles and people, extensive anti-theft protection; analysis of motion profiles, staff occupancy, workflow and deployment efficiency; particular workplace or entire site condition monitoring (e.g. temperature, humidity); hazardous areas securing, emergency situation monitoring and evacuation procedure management. All of the above apply to open pits, underground mines, remote sites, as well as gas and oil industries.

Similarly to the previous scenario above, FM devices are installed in industrial mining vehicles (dump trucks, excavators, various loaders, bulldozers, motor graders, etc.), and Bluetooth beacons are stationary fixed to either reinforcement frames or shaft ceiling. Their position is known and used for indoor positioning when tracked mining machinery enters each beacon signal transmitting zone.

The major benefits are maximised productivity and profitability, highly improved workers' safety and discipline, optimised workflow, assets utilisation, machinery and heavy-duty vehicle preventive maintenance procedures, reduced downtime, waste of company recourses, etc.

PERSONNEL, ASSETS AND VEHICLES TRACKING IN MEDICAL EMERGENCY

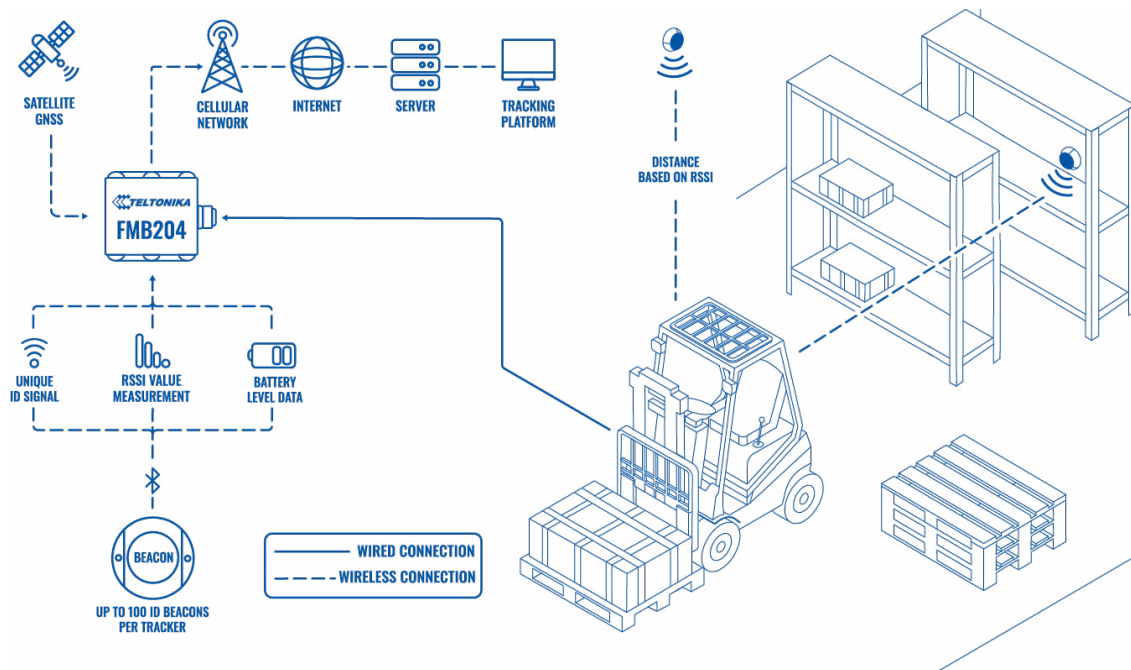


By utilising FM devices and Bluetooth ID beacons combo, fleet managers can significantly benefit by tracking ambulance vehicles, and on-board objects. Here, Teltonika GPS devices installed in vehicles keep tracking ambulances real-time location, and, at the same time, all entities with beacons attached.

This way, the indoor tracking ensures ambulance brigade members, high-value medical equipment and machinery, expensive drugs, medicine location monitoring and, if necessary, its temperature track by adding BLE temperature sensors.

The key benefits are emergency fleet routine procedure optimisation and way better efficiency, medical equipment, drugs and relevant inventory, anti-theft protection and greater accountability, enhanced team communication and readiness, improved dispatch and response time, timely fleet maintenance and operational cost reduction.

TOPOLOGY



BENEFITS

- **Smooth business operations and outstanding efficiency** - 100 per cent accountability of everything important to the business - goods, valuable assets, processes, patterns, and personnel actions are being tracked, monitored, and optimised. Maximum results with a minimum effort.
- **Impeccable customer service and brand reputation** - real-time visitor, customer, patient or passenger flow monitoring and navigation; if applicable, location services smartphone apps, maps, and audio guidance to improve user experience, loyalty, and company image.
- **Improved profitability and competitiveness** - considerable cost savings because of cutting goods, valuable asset loss expenses, anti-theft protection; location and/or action-based marketing campaigns to boost profits, improved cash-flow and investment/expansion opportunities.
- **Enhanced security and fewer accidents** - improved staff and visitors security and safety, prevention of workplace accidents or deaths and cutting the cost of work-related injuries, better-co-ordinated premises evacuation procedures, etc.
- **Customisable solutions for every project** - to get the maximum value out of it, Teltonika BLE beacon signal strength and data transmitting intervals can be configured to exact project application needs and used in, practically, any form and size buildings.
- **Low-cost fast and easy installation** - hassle-free wireless BLE beacons installation process is inexpensive, swift and eliminates a human error possibility. If damaged or stolen, any Teltonika beacon can be quickly replaced.

WHY TELTONIKA?

Here at Teltonika Telematics, we research, design, develop, manufacture, innovate, supply products, and provide impeccable customer service to our clients and business partners in over 160 countries around the world. This is the right place to get all you need to succeed - an impressive variety of GPS trackers, beacons, sensors, and solutions.

For indoor tracking and positioning solutions, we offer time-tested easy-to-install hardware and firmware combo - Bluetooth 4.0 based technology ID beacons and unquestionably reliable GPS trackers - for a wide range of projects, applications and industries such as logistics, travel, transportation, mining, construction, retail, healthcare, tourism, smart buildings, and so on.

Our over 20 years expertise and innovative approach, extensive global market knowledge, exemplary product quality, range, top-notch production facilities and customer support meeting your expectations give us a competitive edge and make Teltonika Telematics a business partner of choice.

FEATURED PRODUCT

FMB204

RECOMMENDED PRODUCTS

FMC001, FMM001, FMC125, FMC130, FMC640, FMM125, FMM130, FMM640, FM3001, FMU125, FMU126, FMU130, FMB110, FMB120, FMB130, FMB140, FMB122, FMB125, FMB202, FMB208, FMB204, FMB964, FMT100, FMB001, FMB010, FMB003, FMB020, FMB002, FMB900, FMB920, MTB100.

