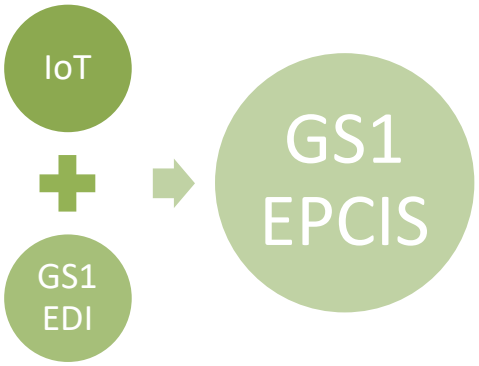
TrackOne Platform

TrackOne Platform is a **multi-tenant solution** developed by **New Generation Sensors S.r.l.**, designed for the intelligent management of data and documents in **multimodal and cooperative logistics**. This cutting-edge cloud platform integrates **connected measurement devices**, **blockchain and IPFS technologies**, and **GS1 EPCIS 2.0** and **GS1 EDI** standards, ensuring reliability, interoperability, and security in supply chain management processes—independently of the mode of transport. TrackOne stands out for its **open and scalable architecture**, capable of collecting, analyzing, and sharing in real time both IoT data and digital documents from across the supply chain. It enables **enhanced traceability** at multiple levels—from individual products to logistics units to transport vehicles—through a **technology-agnostic approach** that supports everything from barcodes to IoT sensors. Thanks to its high level of **interoperability and modularity**, the platform can aggregate data from multiple stakeholders, including **heterogeneous digital platforms** from various service providers and devices with different specifications and manufacturers. The **advanced processing** of this data enables the generation of events and the complete mapping of the supply chain, providing a **dynamic and evolving view** of the entire logistics ecosystem. This capability allows companies to **optimize operational processes**, reduce inefficiencies, and make strategic decisions based on reliable, up-to-date information.TrackOne Platform fully leverages the **cooperative features of the GS1 EPCIS 2.0 standard**, enabling **secure, structured, multi-tenant, and seamless** data collection and sharing across the supply chain. This approach aligns perfectly with the **Physical Internet (PI)** paradigm, which promotes interconnection and interoperability across diverse logistics systems, transforming the sector into a more collaborative and efficient ecosystem.



Within the context of the Physical Internet, TrackOne Platform enables the **integration of IoT devices, EDI documents, and digital platforms** from different logistics operators and service providers, **optimizing resource management** and ensuring **real-time and secure data sharing**.
Thanks to TrackOne, companies can adopt a model of **connected and intelligent logistics**, built on **transparency, standardization, and interoperability**. Key benefits include:

- **Complete supply chain visibility** and reduced operational costs
- **Logistics automation** and optimization of decision-making processes
- **Increased data security and traceability**, through integration with blockchain and IPFS
- **Adoption of GS1 international standards** for efficient, scalable, cooperative, and multi-tenant supply chain management

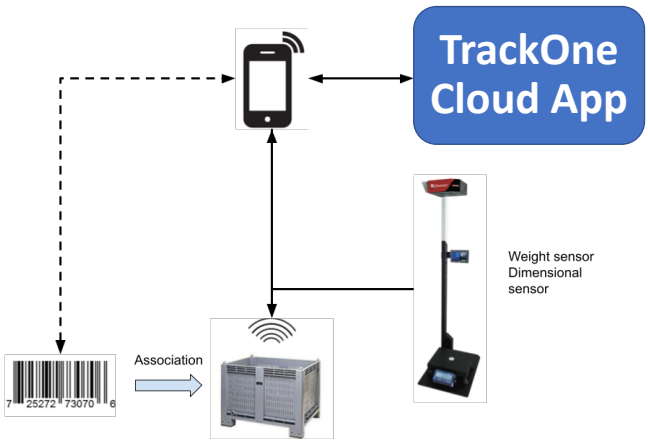
With TrackOne Platform, **New Generation Sensors is redefining the future of logistics**, offering companies an innovative solution to enhance **collaboration, competitiveness, operational efficiency, and sustainability** in multimodal supply chain management.

Use cases

Weight and Dimension Data Management with TrackOne Platform

TrackOne Platform is designed to provide IoT-based services for the **identification, characterization (quantity, measurement, weight, and dimensions), tracking, and monitoring of logistics units**. Data can be acquired through connected weighing scales and dimensioning sensors, which communicate via BLE with mobile devices and are then processed by the cloud platform. TrackOne enables seamless interaction with the **GS1 EPCIS repository**, **blockchain**, and the **IPFS distributed file system** to ensure the **secure and immutable storage** of weight and dimension data. The key functionalities of TrackOne Platform for weight and dimension management include:

- **Data acquisition**: TrackOne collects real-time measurements from connected devices, as well as declared values from EDI documents.
- **Automated analysis and comparison**: Measured values are automatically compared with declared or previously recorded data, with anomalies highlighted.
- **Logistics status updates**: Each unit is associated with a GS1 identifier, and its status is updated based on the newly collected data.
- **Secure and interoperable data sharing**: All measurement events are structured according to GS1 EPCIS standards, ensuring full transparency and traceability.
- **Data notarization**: Measurements and anomalies are archived via IPFS (structured according to GS1 EPCIS) and their hash is recorded on blockchain, guaranteeing data integrity and authenticity.



The adoption of TrackOne Platform for managing the weight and dimensions of logistics units offers **significant benefits in terms of operational efficiency, cost reduction, and regulatory compliance**, including:

- **Cost optimization**: Prevents billing discrepancies, improves load space utilization, and reduces overloading and additional costs.
- **Higher accuracy and traceability**: Real-time monitoring, integration with ERP/WMS systems, and certified data via blockchain and GS1 EPCIS.
- **Compliance and safety**: Adheres to international regulations, prevents overloading, and enables automated documentation for audits and inspections.
- **Operational efficiency**: Automates measurement processes, reduces manual errors, speeds up warehouse operations, and simplifies returns management.
- **Sustainability**: Enhances transport efficiency to lower CO_2 emissions, improves packaging usage, and supports better reverse logistics.

The implementation of these solutions ensures **greater transparency**, **reduced waste**, and **improved logistics performance**, contributing to a more **efficient and sustainable supply chain**.

TrackOne App – Scalable IoT Solution for Supply Chain Visibility and Control

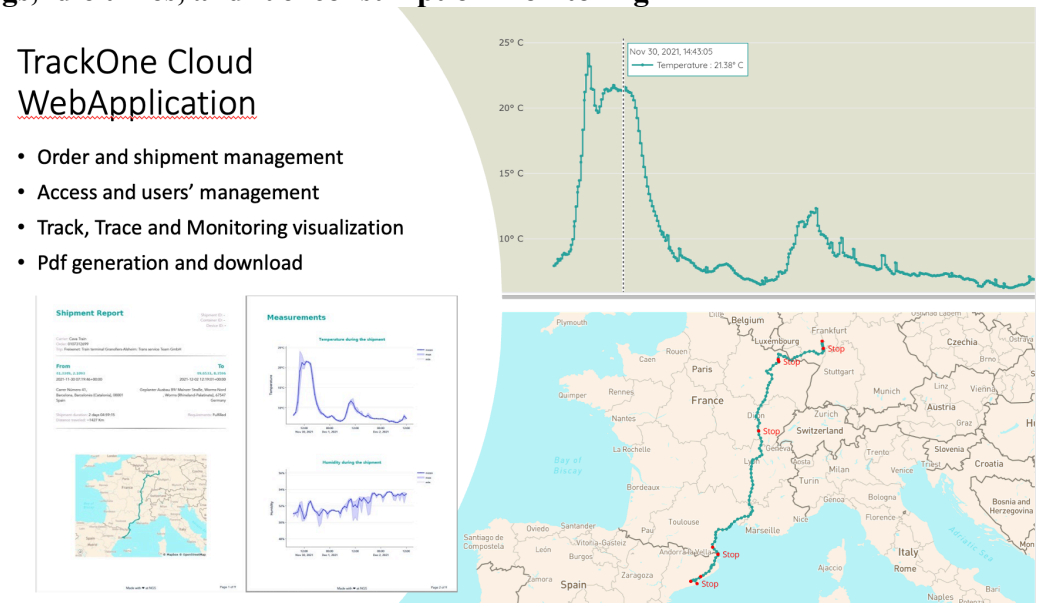
TrackOne App is a **scalable and highly specialized IoT solution**, designed for logistics companies seeking to enhance **control, traceability, and operational efficiency** across the supply chain. Through a **cloud-based platform interconnected with IoT devices** and based on **GS1 EPCIS standards**, TrackOne enables **end-to-end visibility** over logistics units (containers, pallets, smart boxes), assets, and transport vehicles—allowing companies to monitor shipment status in real time and ensure both **process optimization and security**.

TrackOne empowers companies to **identify, characterize, track, and monitor** each logistics unit and its associated transport vehicle, providing a **high-resolution view of the supply chain** and enabling **advanced logistics management**.

Thanks to its integration with **advanced IoT devices**, TrackOne delivers **comprehensive and granular traceability**, monitoring all key logistics parameters. Each logistics unit is assigned a **unique digital identity**, optionally enriched with embedded sensors that collect real-time data and transmit it to the cloud platform—improving the **depth, accuracy, and availability of logistics information**.

Main features include:

- **Automatic identification of logistics units** through barcodes, RFID tags, or embedded IoT devices.
- **Support for load consolidation and characterization**, including **weight and dimension measurement** of individual logistics units.
- **Real-time GPS tracking** of containers, pallets (or general logistics units), and vehicles, as well as **environmental condition monitoring** via integrated sensors or external IoT networks.
- **Shipment condition monitoring**, including **temperature, humidity, shock, and light exposure**, to ensure goods safety and compliance.
- **Transport vehicle usage and operational status tracking**, including **container door openings, idle times, and fuel consumption monitoring**.



This combination of data enables **precise control over the status and movement of goods throughout the entire supply chain**, enhancing both **security and operational efficiency**.

By managing different levels of granularity within logistics units, the system supports **condition monitoring functionalities** tailored to the specific needs of various sectors, including:

- **Perishable goods** (e.g., food, pharmaceuticals), through the monitoring of **temperature and humidity conditions**.
- **Luxury goods and sensitive items**, through enhanced **security and transport condition tracking**.
- **Specialized sectors**, with the ability to integrate **advanced sensors**—such as **ethylene sensors for fruit ripeness monitoring**, or dedicated sensors for **pharmaceuticals and high-value goods**.

TrackOne is the ideal solution for logistics companies aiming to innovate their supply chain, improve operational efficiency, and reduce risks—offering a highly customizable platform that seamlessly integrates into existing business processes. The main benefits of adopting the TrackOne solution for logistics companies include:

- **Reduced operational costs** through supply chain process optimization.
- **Improved risk management** with continuous cargo monitoring.
- **Greater environmental sustainability** by minimizing unnecessary trips and waste.
- **Increased customer satisfaction** by ensuring a transparent, reliable, and secure supply chain.
- **Standardized data sharing**, making companies ready to face future challenges in **collaborative logistics** and the **Physical Internet**.

The Smart Box

NGS Smart Box is a reusable container delivered in an as-a-service model, integrating advanced IoT technologies for the monitoring, tracking, and intelligent management of goods across the entire supply chain. Designed for multimodal logistics and independent from the mode of transport, it enables the real-time collection, processing, and sharing of critical data related to the location, environmental conditions, and integrity of transported goods.

Thanks to its modular design and advanced connectivity, the Smart Box supports both first- and last-mile logistics, as well as cargo transport by road, rail, sea, and air. The intelligent monitoring system detects key parameters such as temperature, humidity, vibrations, and shocks, ensuring high standards of safety and quality for the transport of sensitive goods, including pharmaceuticals, food products, and luxury items.

Data collected by the Smart Box is managed through **TrackOne App**, NGS's cloud-based platform for end-to-end supply chain traceability. TrackOne allows users to process and visualize data through intuitive dashboards and to share it in a standardized format thanks to GS1 EPCIS integration, ensuring full interoperability with major enterprise management systems. Furthermore, **blockchain technology** secures the data, guaranteeing safety, integrity, and transparency across the entire logistics chain.

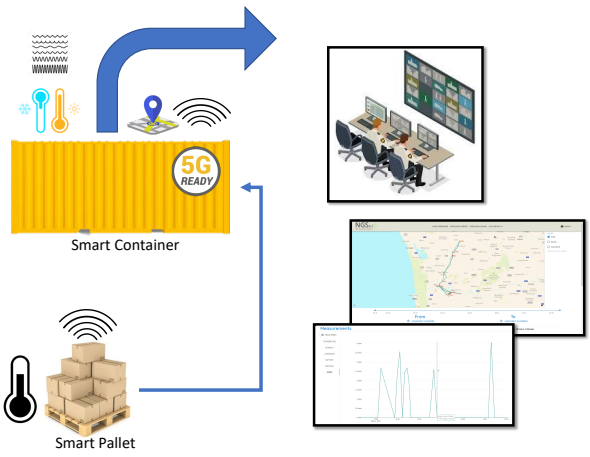
Thanks to its reusable design and as-a-service delivery model, the Smart Box is a **sustainable solution**, helping to reduce environmental impact and optimize logistics processes. The system is highly customizable, with the possibility to integrate third-party sensors and adapt to specific needs, such as advanced environmental monitoring.

The integration between Smart Box and TrackOne represents a **strategic innovation** for companies operating in critical sectors, offering a more efficient, secure, and transparent supply chain. This synergy enables the **smart and sustainable management of logistics resources**, enhancing both competitiveness and operational resilience on a global scale.

NGS IoT devices

The implementation of a smart logistics unit can be achieved through two distinct approaches, each with specific technical features and operational advantages. The choice of the most suitable solution depends on the context of use, the required level of connectivity, and the need for real-time data collection and management.

Implementation with Onboard Infrastructure (Vehicle or Container-Based)



In this scenario, the monitoring system is based on the installation of dedicated infrastructure directly on the transport vehicle (truck, ship, airplane, or train) or inside the container used to move the goods.
The core of this infrastructure is the **Smart Router**, a device equipped with remote connectivity (4G/5G) and geo-localization features that also enables Bluetooth beacon technology.
The smart logistics units (Smart Boxes or pallets with embedded sensors) are equipped with **Bluetooth Low Energy (BLE) beacons**, which transmit short-range data to the Smart Router installed in the transport vehicle or container.
The router acts as a **gateway**, aggregating data received from the beacons and forwarding it in real time to a cloud system via mobile networks (4G/5G).

Advantages of this approach:

- **Lower power consumption** for smart logistics units, as BLE beacons require minimal energy to operate.
- **Extended operational life** of smart logistics units, enabling longer usage cycles.
- **Centralized monitoring** and **reliable connectivity**, thanks to data management through a single transport gateway.
- **Easy scalability** across fleets or standardized containers.

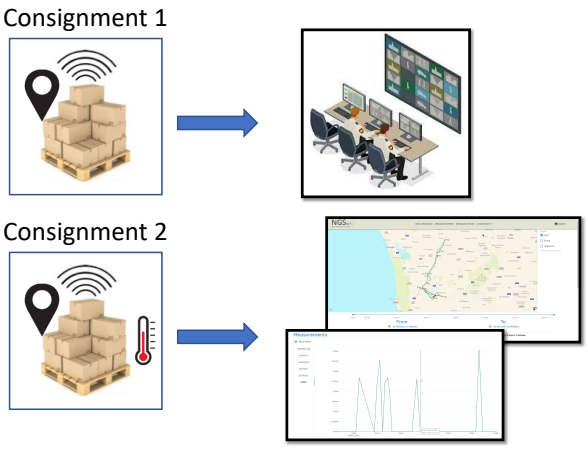
Limitations:

- **Requires Smart Router installation** on transport vehicles or containers, which increases initial infrastructure costs.
- **Dependence on the vehicle** for data transmission: if a smart logistics unit is moved to a vehicle without a Smart Router, connectivity is lost.

Implementation with Standalone 5G-Enabled Smart Logistics Units

In this second scenario, smart logistics units are equipped with a **standalone tracking module based on 5G technology**, capable of collecting advanced measurements, processing them locally, and transmitting them directly to a cloud platform—without the need for additional infrastructure beyond cellular networks.

This solution is particularly suited for **tracking logistics units across multiple modes of transport**, without requiring a connection to a centralized router. The **Smart Box itself acts as an intelligent network node**, detecting and transmitting critical parameters such as location, environmental conditions (temperature, humidity, vibrations, shocks), and the integrity of the transported goods.



Advantages of this approach:

- **Greater operational independence**, as each unit is autonomous and can be monitored anywhere without relying on fixed infrastructure.
- **Continuous and real-time monitoring**, regardless of the transport vehicle used.
- **Higher data granularity**, with the ability to perform **local processing through edge computing**.
- **Easy deployment**, as it does not require modification or installation on existing vehicles.

Limitations:

- **Higher energy consumption** compared to BLE beacons, as 5G modules require more power to operate.
- **Shorter battery life**, requiring periodic recharging or replacement of smart logistics units. This limitation can be mitigated through **energy harvesting solutions**.

TrackOne Smart Router

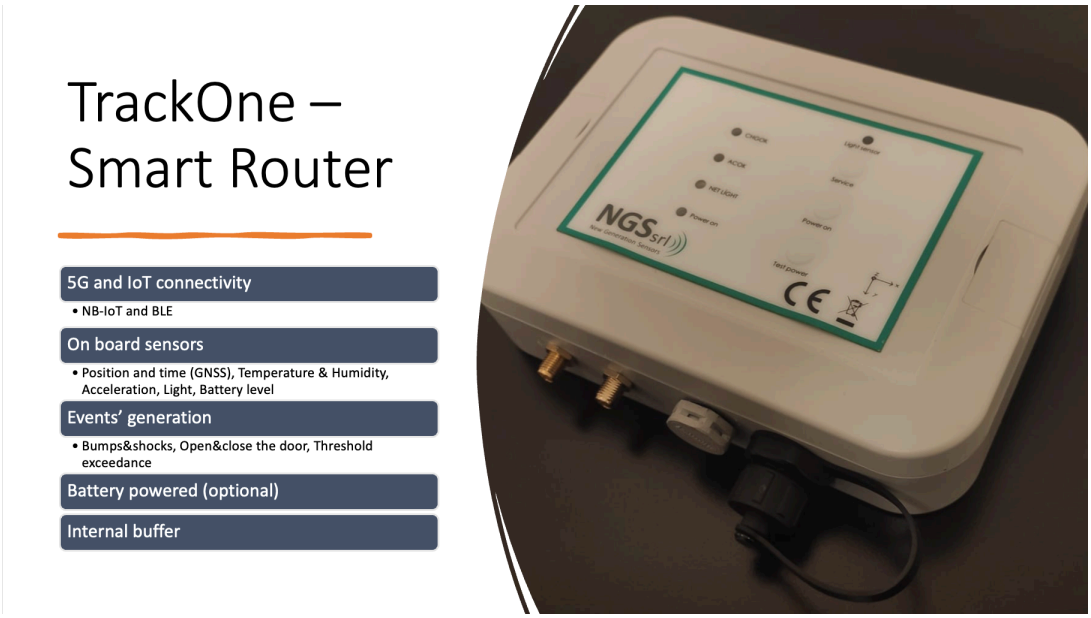
The **NGS Smart Router** is a key component for enabling **advanced connectivity** and **real-time monitoring** of smart logistics units. Designed to ensure **reliable communications in multimodal transport scenarios**, it supports both **cellular networks (4G/5G)** and **local connections (Bluetooth)**, allowing seamless integration with distributed IoT sensors.

Technical Features:

- **Advanced connectivity**: Supports global cellular networks (4G/5G) for real-time data transmission and local communication protocols (BLE) to interact with smart logistics units and value-added sensors for both internal and external vehicle monitoring.
- **Environmental and operational monitoring**: Equipped with integrated sensors for GNSS-based geolocation and timestamping, as well as temperature, humidity, acceleration, and light detection.
- **Critical event management**: Capable of detecting and reporting shocks, abnormal vibrations, and impacts, as well as monitoring door openings/closures using the built-in light sensor or through integration with magnetic reed sensors.
- **Power management**: Can operate either with an optional internal battery—ensuring continued functionality in the absence of external power—or via 12V input, as used in vehicles.
- **Data storage and security**: Includes an internal buffer for storing collected data, ensuring persistence and reliability even in low-connectivity conditions.

Thanks to its **modular architecture**, the NGS Smart Router can be integrated with **value-added sensors**, making it adaptable to a wide range of application needs—from **refrigerated logistics** to the **security of high-value goods**.

Below is a visual representation of the NGS Smart Router.



TrackOne Beacon

The **NGS IoT Beacon** is a **cost-effective, reusable, and highly efficient** device designed for **advanced asset and cargo monitoring**, using continuous data broadcasting over **low-power, short-range communication protocols** such as **Bluetooth Low Energy (BLE)**. Thanks to its **versatile design**, it is available in multiple configurations, each optimized for specific application needs.

Main Configurations and Features:

- **Identification**: Broadcasts a unique identification code for asset tracking and logistics management, enabling **real-time traceability** of goods and logistics units.
- **Temperature and humidity monitoring**: Allows **continuous cold-chain monitoring**, ensuring compliance with critical environmental parameters for the transportation of pharmaceuticals, food, and other sensitive materials. Also available in **EN12830-certified versions**, compliant with European cold-chain monitoring standards.
- **Door status detection**: Equipped with **magnetic reed sensors** capable of detecting door open/close status, helping to identify unauthorized access or operational anomalies.

Technical Specifications:

- **Battery life up to 48 months**, ensuring long-term operation without frequent maintenance.
- **IP67 certification**, providing water and dust resistance, ideal for deployment in harsh industrial and logistics environments.
- **Full compatibility with NGS Smart Router and IoT platforms**, enabling centralized and efficient data management.

With its **energy efficiency** and **modular design**, the **NGS IoT Beacon** is an optimal solution for **scalable, reliable monitoring** of logistics units, improving **visibility and security** throughout the supply chain.

TrackOne Tracker

The **NGS Tracker** (currently under development) leverages **next-generation ultra-low-power IoT technology** to offer an **innovative solution for continuous cargo monitoring**, ensuring **security, traceability, and integrity** throughout the entire logistics chain. Based on **5G NB-IoT technology**, the device is designed for **long-term use with minimal maintenance**, thanks to its **long-life battery** and **solar energy harvesting system**.

The solution enables **real-time geolocation of logistics units** such as containers, pallets, and smart boxes, both in static environments (warehouses, logistics hubs) and during transport. A future upgrade will integrate **5G in-network positioning**, further reducing energy consumption.

Advanced sensors monitor critical environmental parameters such as **temperature, humidity, and shock**, ensuring proper handling of the most sensitive goods.

As part of its development roadmap, NGS is also exploring a **completely battery-less version** of the device, powered by an **advanced energy harvesting and management system**. This approach aims to **minimize environmental impact**, **reduce operational costs**, and eliminate the risks associated with **lithium batteries**, which are classified as hazardous materials.

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