



# Locating Stolen Vehicles & Cargo

## Semtech's LoRa® Technology Enables GPS-Free Asset Tracking Over Public or Private Networks

High-value assets like cargo, vehicles, and equipment are at risk during transit or when left unattended. Semtech's LoRa® Technology offers a GPS-free, cost-effective solution for real-time tracking, automated alerts, and rapid recovery—helping organizations protect their assets and streamline logistics.

## QUICKFACTS

### Company

Maxtrack  
[maxtrack.com.br](http://maxtrack.com.br)

### Customer Profile

Maxtrack is a leading vehicle and cargo tracking solutions provider in Latin America. Specializing in real-time monitoring and recovery of high-value assets, Maxtrack delivers cost-effective, reliable tracking solutions for fleet management, logistics and security applications.

### Objectives

- Protect high-value vehicles, cargo, and equipment from theft and tampering
- Enable real-time asset tracking and monitoring across large or remote areas
- Reduce recovery time for stolen assets
- Minimize operational and infrastructure costs

### Results

- Rapid detection and recovery of stolen assets
- Reliable real-time tracking without GPS
- Lower deployment and operating costs
- Scalable solution supporting large fleets and widespread coverage

### Products and Services

- [LoRa Connect™](#), [LoRa Edge™](#) and [LoRa Core™](#)
- [LoRaWAN®](#) network connectivity.



## INTRODUCTION

LoRa® devices and wireless RF technology (LoRa Technology) is making it easy and affordable for smart supply chain and logistics to track highly valued assets that are in transit. Large, high-value assets like shipping containers full of cargo, capital equipment and the vehicles that transport them are vulnerable to theft whenever they are in transit. Similarly, the large vehicles used by agriculture, construction, mining and other industries present tempting targets to would-be thieves when they are left unattended in remote locations.

Fortunately, they can be secured against theft and tampering by a LoRa-enabled tracking system thus allowing the flow of goods and services to continue. LoRa Technology, combined with Cloud-based services, can unleash the power of the IoT to enable the rapid detection, tracking and recovery of stolen assets.

## CHALLENGE

Large, high-value assets—such as cargo containers, capital equipment and vehicles—are vulnerable to theft while in transit or when left unattended.

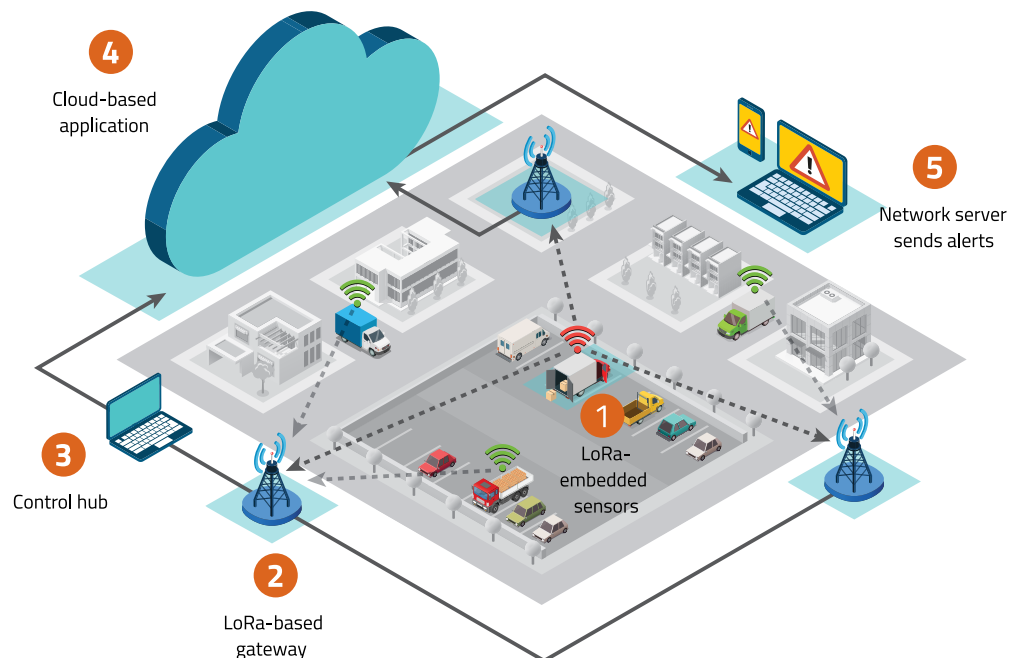
Organizations need a reliable, affordable way to detect tampering, locate assets (even indoors or in remote areas) and recover stolen property quickly.

Applications require route monitoring, detection of deviations and real-time alerts.

## SOLUTION

### Semtech's LoRa Technology for Asset Theft Detection and Recovery System

A customizable data-driven alert system that detects an asset's deviations from its scheduled route.





## HOW IT WORKS

1. Cargo containers, vehicles and other high-value assets are equipped with a smart, self-powered sensor module that can detect unexpected door openings, or other signs of tampering. The sensor module's embedded LoRa transceiver communicates with LoRa-based gateways using the LoRaWAN® protocol.
2. The sensor module's LoRa transceiver periodically transmits its status information to all LoRa-based gateways within its range (typically 5-30 miles). The gateways forward the packets and a precise timestamp (based on time of arrival) to a network server in the Cloud.
3. The control hub also keeps a close eye on the cost of the network server and sends the timestamp information to a location solver that uses a process of triangulation to generate a location fix for the asset. If in motion, its speed and direction are also calculated.
4. A Cloud-based application server checks the asset's status data for signs of tampering and compares its location, speed and direction against a database of authorized locations, routes and schedules.
5. The asset's actual coordinates are compared against its expected location or route of travel and any significant deviations are immediately flagged for further analysis. If the application server detects a potential problem, it can automatically send real-time alerts about tampering or unauthorized movements to security or law enforcement teams. These alerts include the asset's present location and anticipated route of travel, thereby enabling its swift recovery.

## REAL USE CASE SOLUTION

When Maxtrack, a leading vehicle tracking equipment manufacturer, needed to develop its next-generation tracking solution for recovering stolen vehicles and cargo, it evaluated several wireless technologies. In the end, MaxTrack chose LoRa Technology as the basis for its platform because it offered a unique combination of advantages that competing solutions could not match. These include:

### GPS-Free Geolocation

The LoRaWAN protocol supports radio triangulation techniques that can track a LoRa-equipped device without the added cost or power requirements of an embedded GPS receiver. In addition, LoRa Technology operates in the sub 1GHz ISM-bands that can reach deep into buildings and other structures where GPS signals cannot.

### Low Deployment Cost

A LoRa-enabled application can operate over public infrastructures when they are available, eliminating the need for large capital expenditures. When Maxtrack set up one of its early vehicle tracking systems in metropolitan areas of Brazil, the availability of commercial LoRaWAN networks enabled swift deployment with greatly reduced CAPEX costs. For applications that require a dedicated infrastructure, LoRa Technology's long-range, low-power platform can connect to sensors that are as far as 30 miles away, thereby minimizing the number of gateways needed to serve an area.



### Low Per-unit Cost

Adding LoRa Technology to an end-node sensor module requires a single, low-cost IC, making it easy for Maxtrack to offer its products and services at highly competitive prices. LoRa-based gateways are equally affordable, with carrier-grade units, capable of covering a 15+ square miles service area, available for around \$1,500 USD.

### Low Operating Cost

Maxtrack and its customers enjoy minimal downtime and maintenance costs because LoRa Technology's low-power operation allows a battery-powered sensor end-node module to operate up to 10+ years between battery replacements.

### Standards-based

Because the LoRaWAN protocol is a globally approved standard, Maxtrack can sell products that have assured global interoperability. LoRa-based products also benefit from the economies of scale that reduce unit costs and further accelerate its adoption.

### Secure

LoRa Technology secures all communications using end-to-end AES128 encryption, making Maxtrack's systems highly resistant to cyber-attacks and data interception.

### High Capacity

A single LoRa base station can handle millions of messages per day, ensuring Maxtrack's asset tracking solutions are able to support large, active, customer bases.

## BENEFITS

The infrastructure for a LoRa-based asset tracking solution consists of one or more wireless gateways distributed across a campus, city, state, or other area of interest. The gateway can be deployed as a private network or added to an existing low-power wide-area network (LPWAN) infrastructure, such as those used by cellular carriers and cable operators.

A LoRa-enabled gateway can communicate with any asset equipped with a low-power radio that supports the LoRaWAN® protocol. When embedded within a sensor module, it enables remote monitoring of conditions such as temperature, shock, vibration, or tampering. It is also possible to determine a LoRa-equipped asset's location and direction of travel using radio triangulation.

### Jump-Start Your IoT Development Today:

Learn about Semtech's LoRa® Technology platform [www.semtech.com/iot](http://www.semtech.com/iot)  
Become a member of the LoRa Alliance® [www.lora-alliance.org](http://www.lora-alliance.org)

### About Semtech

Semtech Corporation (Nasdaq: SMTC) is a high-performance semiconductor, IoT systems and cloud connectivity service provider dedicated to delivering high-quality technology solutions that enable a smarter, more connected and sustainable planet. Our global teams are committed to empowering solution architects and application developers to develop breakthrough products for the infrastructure, industrial and consumer markets.

To learn more about Semtech technology, visit us at [Semtech.com](http://Semtech.com) or follow us on [LinkedIn](#) or [X](#).

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