

TECHNICAL DOSSIER

Locating personnel where GPS cannot reach

Real-time location system for security teams across metro networks and other underground infrastructure. No civil works, no tags and nothing installed in your network.

5-10 m

accuracy in station

< 5 s

publication latency

99.95 %

availability (SLA)

0

beacons in your infrastructure

01 The problem

On a metro network, knowing where security staff are is critical to coordinating an incident. Underground, GPS does not solve it: with no satellite signal there is no position, and what the handset returns — the last known position, or a cell-based estimate hundreds of metres out — is worse than no data at all, because it looks exactly like a good reading.

The classic alternative, beacon-and-tag RTLS, demands cabled anchors per zone and an active tag per person. On a network in service that means works, permits, night-time windows and months of calendar. It is where most of these projects stall.

- GPS does not reach: no satellite signal, no reliable position.
- Classic RTLS demands civil works on a network that cannot stop.
- Tags have to be handed out, charged and replaced every shift.

02 How it works

Metrosafe introduces no hardware into the infrastructure. The app runs on the Android terminals officers already carry on duty, and ranging relies on the Wi-Fi access points already mounted across stations.

01 Terminal

Wi-Fi RTT/FTM (IEEE 802.11mc) measures the round-trip time of the signal to each access point: an actual distance, not an estimate from received power. It fuses Wi-Fi, cellular and GPS where available, dynamically picking the most reliable source.

02 Fusion

Probabilistic filters (EKF/UKF) combine the measurements and constrain them to the real layout of platforms, concourses and tunnels. Impossible positions are discarded; multipath and non-line-of-sight readings are detected and downgraded.

03 Portal

Live map, history and event replay. Two-factor, role-based access, an audit trail and history export.

03 On-board layer (optional)

Station-level location leaves a gap: the officer patrolling inside a moving train. There the reference moves, the car is a metal box, and a metric coordinate cannot tell whether someone is on the platform, boarding, or already inside the departing train.

The on-board layer fits **one BLE beacon per carriage** and publishes which train, which car and which station each officer is at. It is not a coordinate with an error margin: it is an exact identification.

The beacons sit **inside the rolling stock**, not in the infrastructure: adhesive, battery-powered, with no cabling and no power take-off from the vehicle, fitted during a depot visit. Not a platform and not a metre of tunnel is touched, and people still carry nothing.

A side effect that often decides the project: with this layer **you do not have to survey the tunnels**. Between stations, car identity replaces the coordinate, so the radio survey can be limited to whichever stations matter.

04 Specifications

Accuracy in station	5-10 m
Publication latency	< 5 s
Refresh rate	configurable · 15-30 s recommended
Availability	SLA ≥ 99.95 %, 24×7×365 support
Verified scale	≥ 70 concurrent terminals
Terminal	Android 10 or later with FTM-capable chipset
Network	802.11ac/ax with FTM enabled
On-board layer	one BLE beacon per carriage; returns train, car and station
Integration	REST API, webhooks and CSV/JSON export
Roadmap	IEEE 802.11az compatible without redesign

05 Security and compliance

In critical infrastructure the final technical call is not made by the person who needs the system, but by the person accountable for the network. This is the part that matters to them.

- TLS encryption in transit and at rest
- Mandatory two-factor authentication
- Role-based access control (RBAC)
- Network microsegmentation
- Rate limiting and OWASP API protection
- Audit trail of access and actions
- Continuous SAST and DAST in CI/CD
- External cybersecurity audit
- Configurable data retention
- Anonymisation where the use case allows

Regulatory framework: designed to the Spanish National Security Framework (ENS) and CCN-STIC guidance. Certifications held: ISO 9001, ISO/IEC 27001 and UNE 166002. Aligned with the European NIS2 (EU 2022/2555) and CER (EU 2022/2557) directives.

Worker privacy. Locating personnel means processing personal data. Metrosafe is deployed with a purpose bounded to operational safety, prior information to staff and their legal representatives, bounded retention, anonymisation for analytical uses and logging of who queries the history.

06 What it takes, and what it does not

Not needed

- No civil works
- No beacons or anchors in the infrastructure
- No tags on people
- No service interruption
- No change of network vendor

Needed

- Access points with FTM enabled
- Compatible Android 10+ terminals
- Secure backhaul to the backend
- Station layouts for map matching
- Depot access only if the on-board layer is added

The critical point of the project is the first item on the right: **how many of your access points can enable FTM**. It is checked with an inventory, not a pilot, and it determines which stations are in.

07 **Getting started**

A scoped pilot of 8 to 16 weeks over one line or a set of stations, with numeric acceptance criteria agreed in writing before it starts.

01 **Survey**

Inventory of FTM-capable access points, per-station radio study and approval of the terminal models in the fleet.

02 **Go live**

App on the terminals, server and portal in service, telemetry and security active from day one.

03 **Measurement**

Accuracy and latency campaigns per station against the agreed criteria, and calibration of each site's biases.

04 **Decision**

A report with real metrics from your own network, ready for the procurement file.

Mean accuracy in station	5-10 m
Publication latency	< 5 s
Availability during the pilot	≥ 99.95 %
Concurrent terminals	≥ 70 under nominal use
Security audit	no open critical findings

Tell us about your network

With an inventory of your access points and the layout of two or three stations we can already tell you what to expect. It is the shortest and most useful conversation.

metrosafe.app
hola@metrosafe.app
+34 924 090 608