

GPS Coverage Extension Solution

SubWAVE

Expands GPS coverage to underground places.



SYNTONY

GNSS

Simulating GPS signal within confined areas

GPS coverage has become fundamental for many services, from personal navigation to operational management. Yet, when entering an underground area such as a subway or a tunnel, the signal dies out and prevents benefit from any GPS based application. SubWAVE Simulator expands GPS coverage to those confined areas and therefore enables the location of any equipment using a standard GPS chipset, without having to download a specific application.

SubWAVE can also be available if requested for all other constellations: GALILEO, BEIDOU, IRNSS, GLONASS, QZSS.

SubWAVE can benefit to subway operators and the public in every facility equipped with the system:

railway or underground stations, rail or road tunnels, ...etc... Therefore, SubWAVE is the solution to operational purposes (locate trains, spot defaults along tunnels), as well as safety ones (locate isolated subway agents, emergency calls, guide rescuers, etc.) or even «just» to help passengers find their way undergrounds.

Designed to map the existing architecture of Cellular or PMR systems using DAS (Distributed Antenna Systems), SubWAVE's installation requires no modification of terminals and is compliant with existing equipment (TETRA, P25).

SubWAVE is easily upgradable for further purposes making it a long-term investment at an affordable cost.



Locate emergency calls



Safety issues are a major concern when talking about underground infrastructure. Locating emergency calls in such complex environments requires a technology that can provide an instantaneous location for anyone in need.

SubWAVE provides a seamless transition emulated GPS positioning service regardless of the device used in any confined environment:

Smartphone or professional receivers like P25 or TETRA. Security comes first for public infrastructure operators: most countries intend to deploy emergency regulations such as E911 or E112 to easily locate victims when calling emergency numbers.

Emulating standard GPS signal, SubWAVE allows GPS chipset in any smartphone to benefit from the coverage and send to the

rescue teams a precise location of the emergency call. (Depending on SubWAVE, the zone size can be set to comply with the current regulation evolutions.)



Safety experience of all users



Compliance with emergency regulation



Compatible with all smartphones (no specific app needed)

Keep track of workers in underground places

May they be metro agents, policemen, or firemen, keeping track of all workers on an ongoing underground operation is mandatory both for their safety and the success of the operation. Such a scenario relies on being able to localize any kind of GPS device held by workers, seamlessly and with accuracy. SubWAVE allows such a system to be set up, by providing the same GPS signal as outside through the entire underground infrastructure.

SubWAVE is the only product on the market which enables 100% compatibility with all professional receivers used by agents, firemen, and policemen, without adding accessories nor software to their equipment.

SubWAVE can significantly improve your user's experience by making it possible to navigate within your infrastructures with GPS based assistance, especially disabled people or

foreigners using their apps, as long as they rely on GPS signal.



Location of isolated workers to protect them



GPS enabled for outside safety forces management



Compatible with existing GPS based equipment



Spot defaults along your tunnels



/// Maintenance operators walking or driving through tunnels may find defaults that need to be repaired. Losing track of their path can result in major safety issues. A broken screw should not turn into a butterfly effect, and SubWAVE Continuous mode prevents such events from happening.

Using a seamless emulated GPS signal, any device (smartphone, TETRA, P25, or any regular GPS receiver) will keep track of its accurate position as if it were operating outside, allowing you to store and retrieve the default's position easily.



Improve maintenance efficiency



GPS Positioning data sharable



Outside/Inside managing tools homogeneity

Locate your trains throughout any tunnel and notify passengers

/// Knowing the arrival time of a train on a non-scheduled basis is one of today's challenges in public transportation. In outdoor environments, the simple use of a regular GPS receiver sends positioning information of every train that can be translated into on-time/delayed/early status.

Except in tunnels, where the intent of tracking trains with a single GPS receiver is lost. SubWAVE Continuous and Extended modes undo that wrong and enable the use of the same GPS in the tunnels and monitor trains' position to provide accurate time of arrival schedule to passengers.



Improve traffic management



Overview of indoor & outdoor traffic



User's experience improved



Make your facilities available to professional or public guidance



SubWAVE can significantly improve users' experience by making it possible to navigate through your infrastructures with GPS based assistance. Indeed, the unique technology of SubWAVE enables the use of «multimodal application» with a seamless transition between the outside and the inside.

All users can benefit from station coverage, especially disabled people or foreigners using their apps, as long as they rely on GPS signal.



Optimize safety forces ETA



Accessibility compliant



Continuity of regular outdoor services

SubWAVE, 3 modes for universal GPS Coverage Extension

Installed in the same cabinet as telecom equipment, SubWAVE Simulator uses the Leaky Coax Cables already in place to spread a perfect

emulation of «real» GPS. 3 types of positions can be generated, depending on the needs and use cases:

Zone Mode

Currently deployed in Stockholm, SubWAVE Zone mode emits one position for a predefined zone (platform, tunnel portion, etc.). Users can get a position indicating if they are in a stair zone, the left or right platform, the 1st tunnel portion, etc. This mode is ideal for large open areas such as halls and platforms.



Continuous mode / SubWAVE+



This mode generates an infinity of position inside a zone. Therefore, a very smooth precision can be achieved along the leaky feeder and multiple assets (train, technicians, tools, etc.) can position themselves with accuracy in tunnel-shaped places like underground rail tracks and corridors. This mode is available with a specific Syntony software on the receiver or server-side.

Extended mode / SubWAVE*

In between Zone/SubWAVE and Continuous/SubWAVE+ modes, SubWAVE Extended/* emulates two zones on each side of the leaky and several more in between. Depending on the leaky, this «precise» portion is variable and get up to 70% of the total length.



SubWAVE GPS Coverage Solution

Extensions, features, advantages

Best Solution

-  Plug and play installation in DAS infrastructure used by Cellular or PMR
-  Compliant with existing PMR/TETRA receivers
-  No interference with train control or telecom systems
-  Seamless transition with the outdoor/indoor
-  No receiver or server modification
-  No App to be installed on the Smartphone

100% Coverage of stations and tunnels

-  Usage of Leaky Coax Cables along :
 - Platforms
 - Corridors
 - Escalators
 - Tunnels
 - Building basements

Fast and unmatched installation time

-  1 day of onsite demonstration in test station
-  3 to 6 months typical delivery



SYNTONY
GNSS



The future of navigation is software

Since 2015, Syntony has become a leader in the GNSS industry. Syntony offers unique location solutions to ensure safety and efficiency to its customers.

Syntony's solutions are competitive, exclusive and performant. Syntony know-how was inherited from 20 years of R&D and collaboration with industry leaders.

Find us



TOULOUSE - PARIS - SAN FRANCISCO - NEW YORK - MONTREAL

More info on **syntony-gnss.com**

@Syntony_GNSS

