

Seamless and Universal
GPS Coverage Extension

SubWAVE™

for Road



Emergency calls location

As the **standard of location worldwide**, GPS positioning is used outdoor by rescue forces to **locate emergency calls**, and by the public to benefit from **guidance**.

With SubWAVE™, it has become available everywhere.

Extended Safety

To enhance rescue forces response to emergencies, many safety regulations enable dispatch centers to collect the caller's information. Latitude, longitude and altitude are some of them, and GPS provides them natively on every smartphone, used 80% of the times in emergency calls.

By emulating GPS underground, SubWAVE™ can provide this crucial piece of information to dispatch centers, and help saving precious time and lives.

Moreover, rescue forces are constantly positioned with GPS, to help dispatch centers affect

resources with efficiency. With SubWAVE™, this monitoring is extended underground and rescue forces can even benefit from guidance to optimize their ETA, enhancing their response time.

GPS-based Maintenance



Incident prevention

To operate outside, workers can locate any problems and manage to repair it by coming back with the right team and the right tools. With SubWAVE™ installation, maintenance operations inside tunnels can be managed with the same GPS-based tools as outside.

Day-to-day maintenance

To optimize the management of teams and assets, location services are crucial. By using the GPS underground, a simple missing screw causing a butterfly effect can be avoided. Minor problems are difficult for workers to find if you can't locate them. With SubWAVE™, you can pinpoint them on a map to help solve them.



Emergency calls location



Rescue forces optimized action



Improve maintenance efficiency



Location of isolated workers to protect them

Guiding the future of Automotive



Continuity of Guidance Service

GPS and GNSS are used by billions of users to benefit from guidance services anywhere on the planet. Those services are even available from smartphones, with standard apps like Google Maps or Waze.

By extending GPS Coverage into road tunnels, SubWAVE™ offers the continuity of such a service, to everyone. Moreover, traffic data in tunnels can be considered when computing the best route, considerably reducing the risk of jammed traffic and accidents.

Autonomous Driving

With GPS and GNSS available in road tunnels, autonomous cars can benefit from it to perform precise and safe driving.

Member of the 5G Automotive Association (5GAA), Syntony is

constantly improving SubWAVE™ to meet the challenges of GNSS precision and accuracy in road tunnels, to enable a safe and efficient autonomous driving.



Use case: Truck Platooning

Developed to both optimize and secure truck transportation, platooning rely on Vehicle-to-vehicle (V2V) communication and GPS.

With this data, trucks can follow autonomously in tight order a guiding vehicle, operated by a human driver. The platooning enables trucks to consume less fuel, benefitting from aspiration, and reduces risks of human error leading to accident.

With SubWAVE™, Syntony offers the GPS-needed environment for the technology to operate in tunnels and underground areas.

SubWAVE™ has been chosen by the Tunnel du Mont-Blanc to conduct tests in truck platooning research and is a member of 5GAA to develop precise location technologies in indoor environment.

SubWAVE main benefits



SubWAVE™ is a real-time GPS emulator providing signal in facilities out-of-range from natural GPS.

Using telecom network to broadcast, SubWAVE™ emulates GPS signal matching real coordinates, computable by standard chipsets.

Since almost every portable device has a GPS positioning feature, SubWAVE™ allows majority of trackers to keep working underground.

Zone-based or continuous along a path, SubWAVE™ enables efficient positioning, everywhere.

Extension of Universal technology



▶ Real-time GPS emulation allowing continuity of GPS service where it cannot naturally get



▶ Seamless transition between outdoor and underground Receivers will not even notice they switched to Synthetic GPS

Easy implementation



▶ Use of existing telecom infrastructure GPS signal is broadcast through leaky feeders used for coms, or antennas



▶ Compatible with existing equipment P25, TETRA equipment, or even smartphones equipped with standard GPS chipset

Built to evolve with your requirements



▶ Software-defined-radio architecture allowing remote updates New GNSS constellations, algorithms enhancing precision, etc.

They trust us



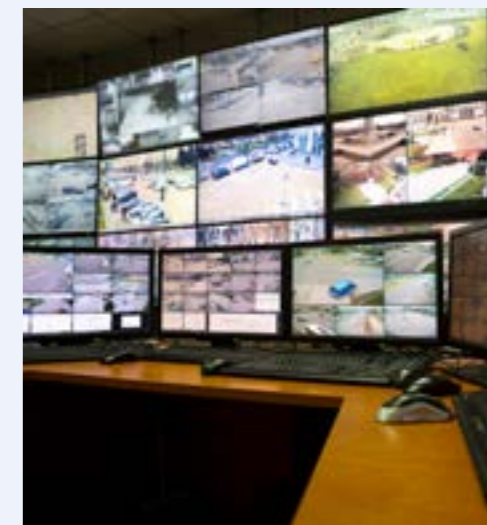
Coordinating Safety Forces in entire Stockholm transportation network with GPS

To coordinate safety forces action throughout Stockholm's transportation network, SL uses GPS to position its teams on ground. This positioning allows the operator to call on the closest team from an incident to intervene fastly and accordingly.

By providing real-time GPS signals in stations and tunnels,

SubWAVE™ enables this use of GPS underground as well.

It allows precise monitoring of assets locations at all times, both above and underground. Third parties like Rescue Forces, or even the public dialing an emergency call benefit from this too, saving precious lives, time, and money.



Enabling trucks platooning in road tunnels by providing GPS signal underground

To develop the truck platooning technology, the "Tunnel du Mont Blanc" operator needs GPS signal to conduct tests in its facility. This GPS feed will be used by trucks to locate themselves along the tunnel and then be able to add a vehicle-to-vehicle (V2V) communication to coordinate with each other, forming a compact autonomous line.

This technique will open the way to autonomous driving protocols based on GPS signal. All users of the tunnel will benefit from this test campaign, as GPS is universal. Guidance services and emergency call location will be extended to the inside of the tunnel, including common apps such as Google Maps or Waze.



Enabling PTC active management in depot with poor GPS reception

Operations did not allow Amtrak Hiawatha trains to select track and be PTC active inside a depot due to poor GPS signal acquisition.

This required the locomotive to occupy main track in a non-enforceable PTC state and was not FRA compliant.

SubWAVE™ solution has offered the GPS coverage extension inside the depot where GPS repeaters do not comply, allowing locomotives to be located and be PTC (positive train control) active to meet safety standards.





For more information

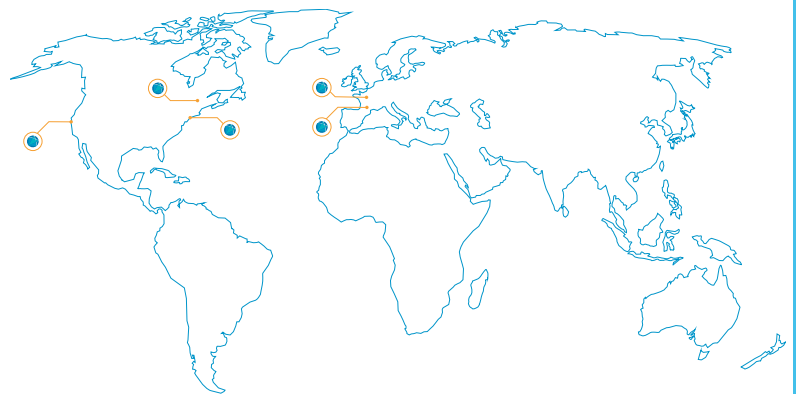
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France Relance supports the development of the SubWAVE™ technology