



exail

**SOLUTIONS FOR RAIL
APPLICATIONS**

Pioneering solutions for train localization and metrology

Since the beginning of the 2000s, Exail products and solutions have been largely used by many railway companies for tracks mapping and data georeferencing.

Thanks to its navigation expertise, Exail now offers a cost-efficient, high-performance real time localization solution. User friendly and compliant to railway standards, our high-performance Atlans R7 inertial navigation system directly answers railway operators. It provides uninterrupted data, in all environments including when GNSS signals are disturbed or non-existent.

exail at a glance

80

YEARS OF
EXPERIENCE

250+

MILLION EUROS
OF TURNOVER

1 500+

EMPLOYEES

25K+

FIBER-OPTIC
GYROSCOPES SOLD

5+

OPERATIONAL TRAINS
EQUIPPED

ERTMS

LOC4RAIL PROJECT
LEADER

300K+

KM TRAVELED

10+

YEARS OF MOBILE
MAPPING SYSTEMS
EXPERIENCE

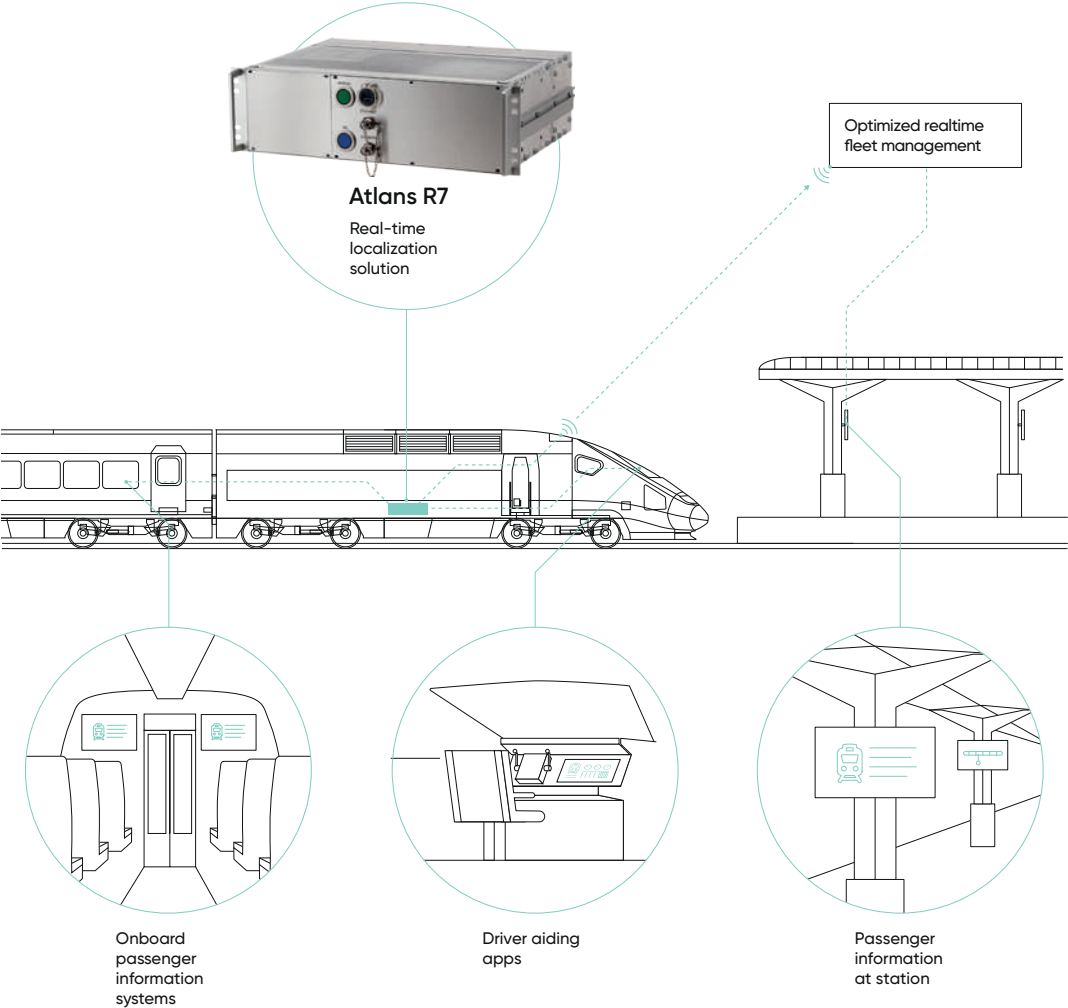
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TECHNICAL SUPPORT

GAME CHANGING SOLUTION FOR TRAIN LOCALIZATION

High rate and accurate geolocalization data

Atlans R7 is a turnkey equipment that gives an edge to railway stakeholders by improving traffic management, railway operations, and all onboard geoservices. It provides real-time and continuous georeferenced position, speed and attitudes of the train. It delivers unrivaled and demonstrated performance better than 5 m over 99 % of the traveled distance along track.



BEST-IN-CLASS PERFORMANCE

Unrivaled real-time accuracy anytime, anywhere

Atlans R7 delivers pinpoint geolocalization and highly accurate speed information, even in GNSS denied environments (tunnels, woods, urban canyons...). In areas with proper GNSS coverage, Exail's Rail Vehicle Model ensures unrivaled accuracy.

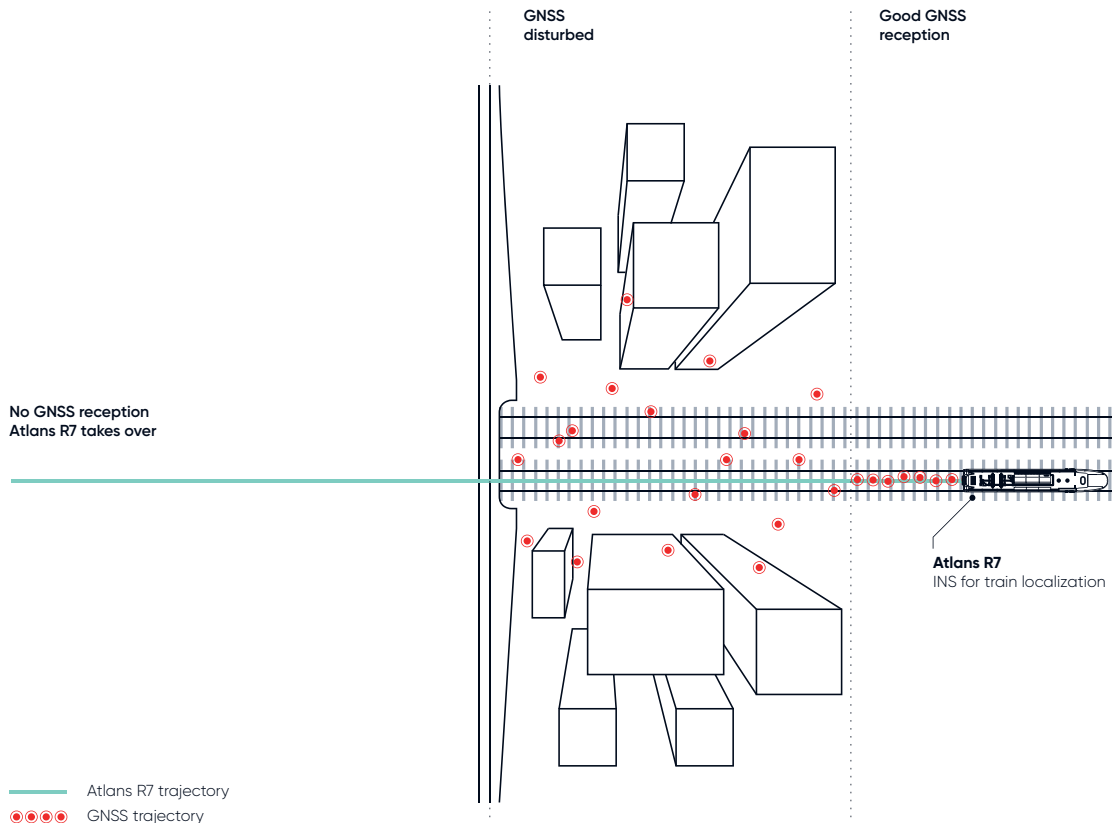
It delivers the highest performance in the market:

- Track selective
- Better than 5 m over 99 % of the traveled distance along track.
- Better than 0.05 % of traveled distance

Fiber-Optic Gyroscope technology

Atlans R7 is based on solid-state fiber-optic gyroscope (FOG) technology. It is the result of more than 30 years of research and development and is today considered to be the best gyroscope in the world. Solid-state, the FOG technology does not involve any movement of mechanical parts causing dithers, vibrations, frictions and resulting in parts' weariness and noise. This ensures many benefits for the user:

- Robustness of the system (Power-on and Forget)
- Cost-effectiveness and the lowest cost-of-ownership on the market



MAJOR PIONEER IN EMBEDDED TRAIN GEOLOCALIZATION

Extensive track record

Atlans R7 already equipped several French trains, ranging from high-speed trains (TGV) to regional and suburban trains (TER and RER), and boasted a massive track record of over 300,000 km of analyzed trajectories.

Key partner for ERTMS program

Exail was the project leader of Loc4Rail ERTMS program for a safe and precise localisation solution.

The disruptive and innovative safe architecture led by inertial technology proposed by Exail benefits directly to European operators and can be quickly proposed to the ERTMS market, or CBTC tracking subsystems.

A recognized and rewarded innovation

Exail was awarded two major European innovation prizes for its inertial real-time train localization solution based on a virtual attitude beacon system:

- The i-Trans 2022 Railway Innovation Award
- The 2022 Railway Innovation Awards delivered by the European Railway Clusters Initiative (ERCI)



COVERING A WIDE RANGE OF RAIL APPLICATIONS

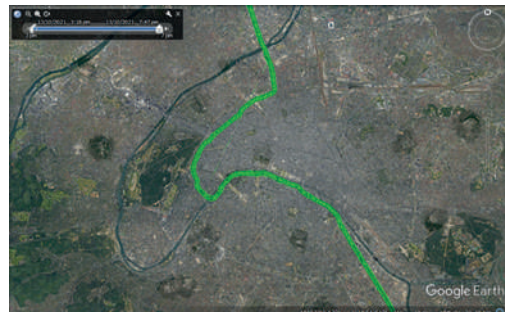
Train localization

Substituting track-based localization infrastructure with onboard train systems offers cost-efficiency benefits, but also poses challenges. Atlans R7 addresses these challenges by ensuring uninterrupted localization in all environments, regardless of GNSS signal strength. It effectively replaces traditional physical balises with cutting-edge virtual ones. Additionally, Exail's solution boasts gyro-compassing capabilities that require no train movement for initialization, providing a significant advantage.

The Atlans R7 is well-suited for seamless integration into the real-time and predictive traffic management chain, enhancing information for passenger and driver assistance tools, such as the Connected Driver Advisory System (DAS).



Geolocalization without Atlans R7
RER line C - Suburban and urban areas of Paris

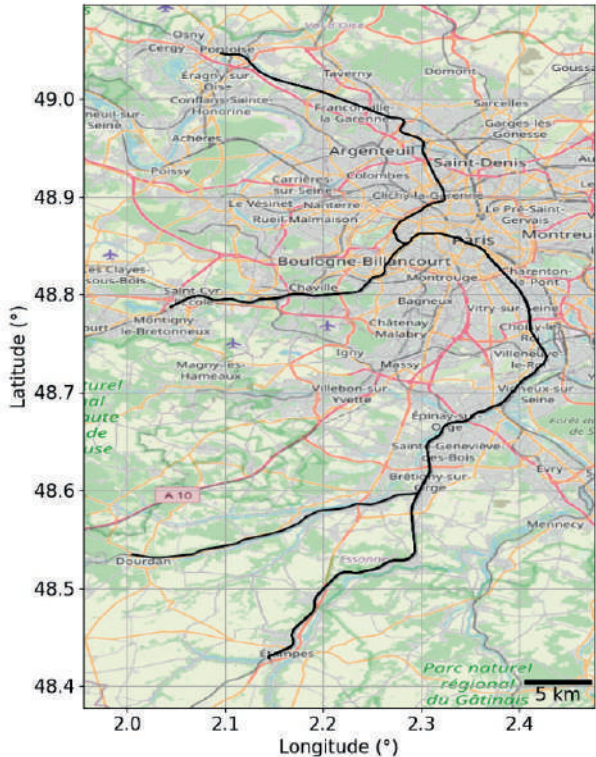


Geolocalization with Atlans R7
RER line C - Suburban and urban areas of Paris

Metrology

As the demand for track geometry measurements continues to grow, there is an increasing need for accurate and reliable data for positioning and georeferencing. Atlans R7 directly addresses this need by providing uninterrupted georeferencing data for train position, speed, and attitude, making it a vital solution for 2D network mapping applications.

Exail's expertise in railway navigation data fusion, combined with its fast post-processing software suite (Delph INS), offers an optimal balance between cost and performance for rail metrological applications. This combination proves invaluable when integrated with various environmental sensors such as cameras, LiDAR, and ultrasonic devices.



SPECIFICATIONS

Atlans R7

Real-time localization inertial solution



PERFORMANCE*	Position	Speed	Attitude
Sampling rate	Up to 200 Hz	Up to 200 Hz	Up to 200 Hz
Along track accuracy in high density urban environment, With SBAS GNSS outages over 20 mn**	<5 m 99 % of measurements	<0.05 m/s 95 % of measurements Fully compliant to Subset-41, regardless of speed	Heading 0.03 Roll&Pitch 0.015
Max along track accuracy without GNSS	<0.1 % DT	<0.005 m/s per 100 m DT	Heading 0.03 Roll&Pitch 0.015

*No map coupling implementation | **From track records on all Paris Suburb Regional Line C

INTERFACES

4G/LTE*	1 x 4G/LTE interface on rear panel - Type N receptacle
Odometer input	1 x odometer input on rear panel - Free-floating blind mate connector
Ethernet port output	1 x PPS output on rear panel - X-coded M12 receptacle

* 4G/LTE for Atlans R7 full configuration (optional)

MECHANICAL

Rack dimensions according to F61-005	3U x 21T x 320 mm
Overall dimensions	132.6 mm height x 483 mm width x 399 mm depth
Weight	17 kg