

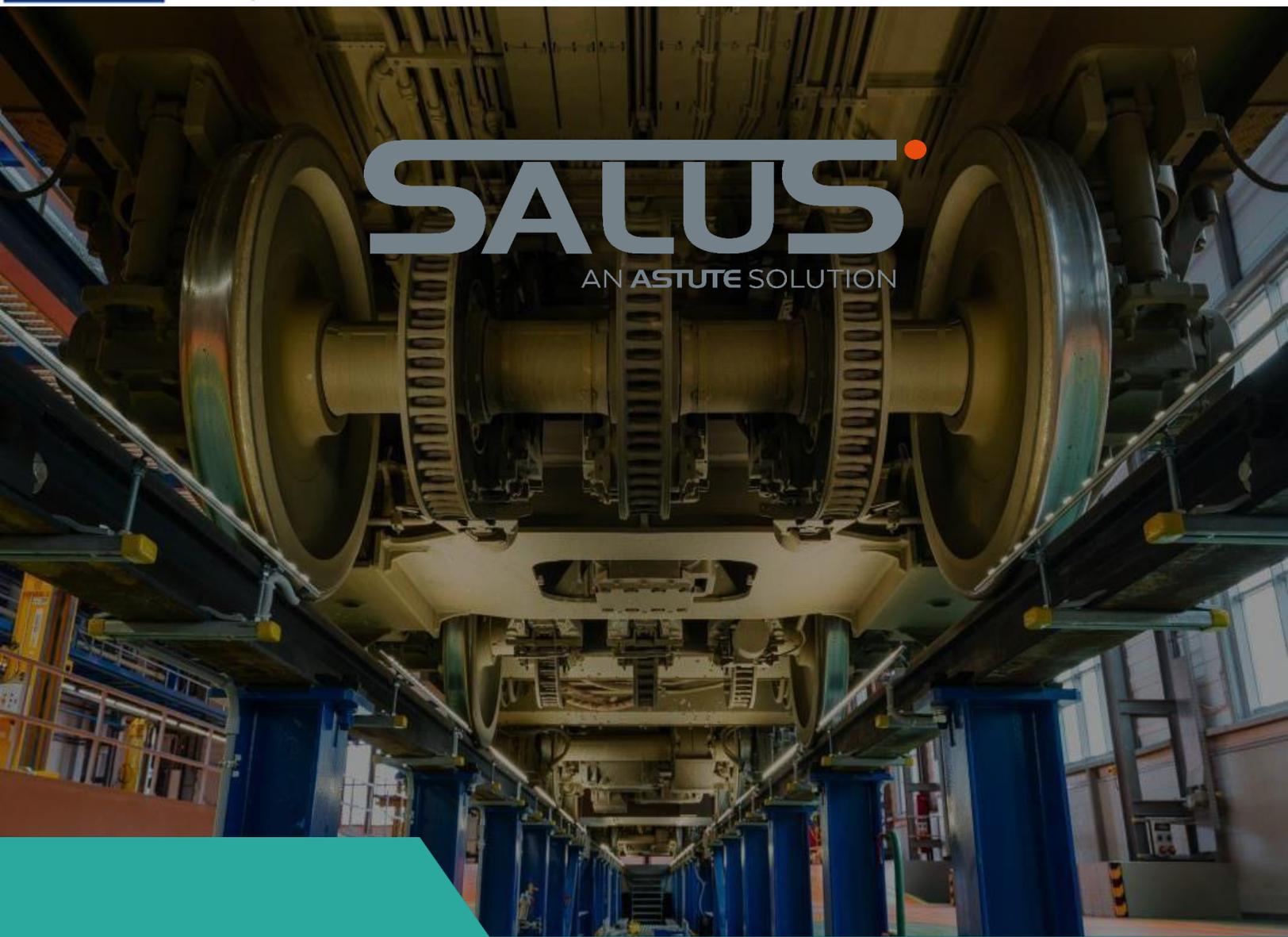


European Union
European Regional
Development Fund



SALUS

AN **ASTUTE** SOLUTION



APPLICATION NOTE

SALUS - Technology
for the Rail Industry

ASTUTE



UNIVERSITY OF
BIRMINGHAM

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of DERBY

Rail Forum

Asset Tracking in the Rail Industry

The railway industry in the UK is looking to continuously improve its performance and efficiency at a time when it is facing significant challenges due to unprecedented growth in passenger and freight traffic. Asset tracking technologies provide crucial information such as location and status of key assets during maintenance operations, leading to a reduction in downtime, resulting in fewer service delays, and ultimately improving the passenger's travelling experience.

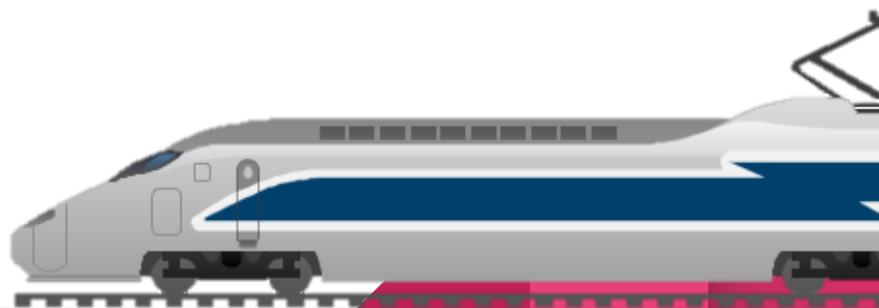
By way of example, asset tracking enables:

- Locating assets quickly, helping to fix faults, more proactive in-service scheduling and better able to plan repairs and upgrades. Deploying location reporting/monitoring technologies in asset management could reduce the overall financial and economic cost of rail disruptions by around £600M per year, according to a report by the National Infrastructure Commission¹.
- Monitoring the location of crew and equipment will ensure the safe and controlled movement of rail vehicles into and out of train maintenance depots. The monitoring technology provides depot maintenance supervisors with better visibility of the status of the road, who is working in each road, and the status of other maintenance equipment when 'tagged' and tracked within the local radio field. This enables depot management teams to plan maintenance tasks and train movement operations more effectively throughout the depot².

However, rail markets are currently poorly served by existing technologies (e.g., based on Wi-Fi, BLE signaling) lacking flexibility in cost, accuracy, security, and process-integration. Current products are also very expensive to install and manage due to limitations in the technology and its application.

¹ Mott MacDonald - Value Analysis: Better Asset Management (Final Report). The National Infrastructure Commission. December 2017.

² Wikipedia. https://en.wikipedia.org/wiki/Depot_Protection_System. (Accessed September 2022).



What is SALUS?

Understanding the challenges faced by the rail industry, SALUS (Serviceable Asset Location & Utilisation System) is a world-leading technology, developed to enable tracking and reporting of the location, status, and condition of assets both indoors and outdoors. Many thousands of mobile, high-value and high-integrity assets (tools, equipment, and materials) can be managed and located over their lifetime resulting in increased operational efficiency - maintaining budgetary control, reduction in theft/loss and remaining safety-compliant.



Increased operational
efficiency



Ensures safety
compliance



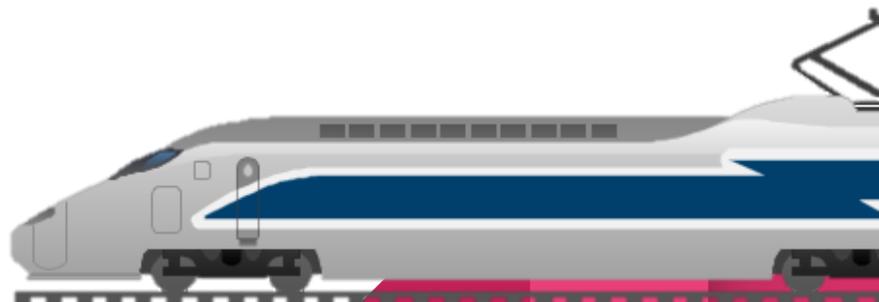
Reduces
management costs

The SALUS System

SALUS is a low power, accurate, indoor and outdoor tracking and data communication system capable of monitoring the location of devices (tags) in a radio network defined by fixed positioning beacons (anchors). When each tag moves through the radio network, its distance to each anchor is measured. By triangulating measurements from three anchors, it is possible to determine the tag location in space.



The SALUS MAP application will provide all user feedback including tag locations and provides a simple user interface to configure and setup all aspects of system operation, including setting up ranging schedules and assigning user access rights (User Management).



All SALUS information and location data is stored and maintained on the SALUS Server (which can be local or cloud-based).

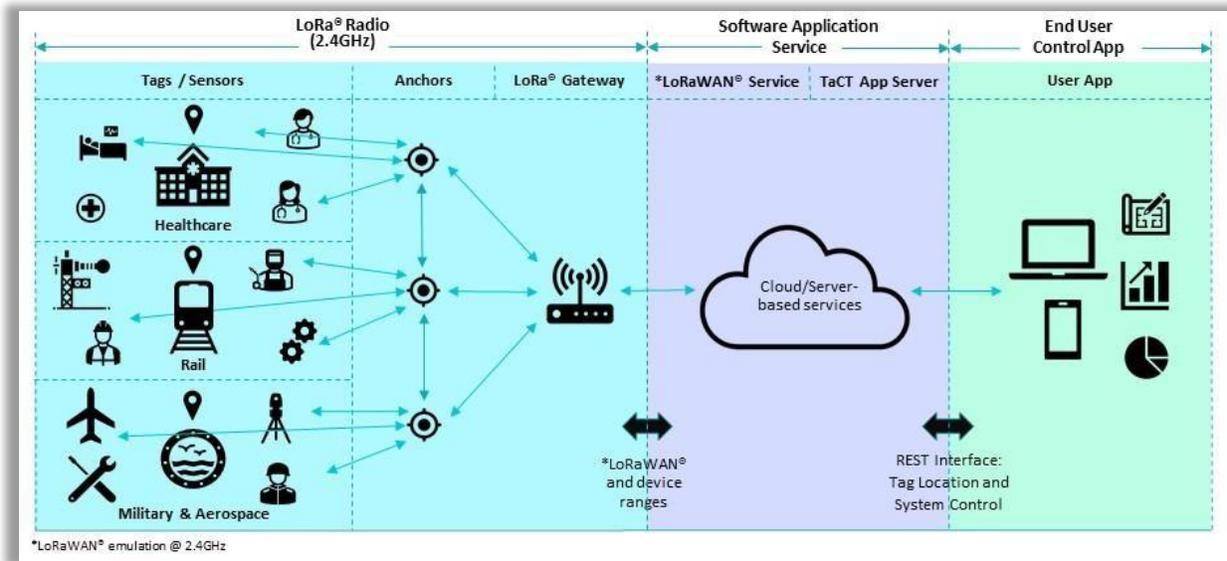
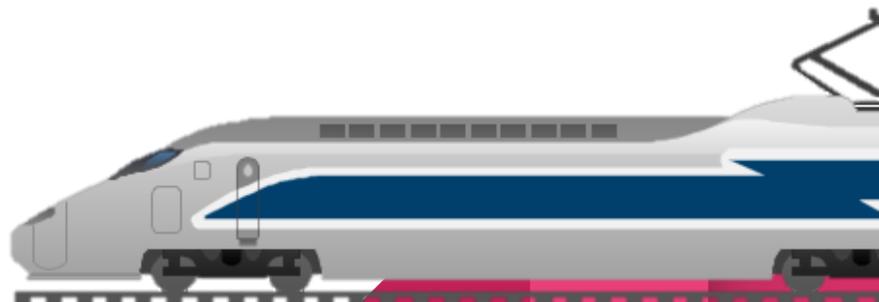


Figure 1. SALUS System Architecture

SALUS is built on LoRaWAN emulation and radio ranging at 2.4GHz, using SX1280 chipset. The SALUS system is a 'one stop shop' solution, with all hardware and software elements provided, including a dedicated Android app. All the devices are robust and use low power, replaceable or rechargeable batteries (lasting up to 3yrs), requiring very little maintenance and installation overheads.



Figure 2. Standard Anchors & Tags



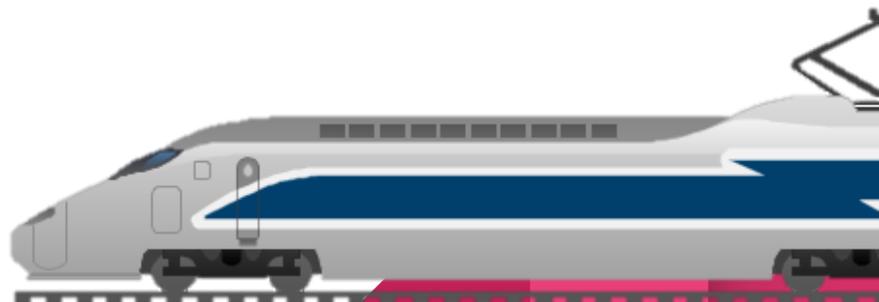
Dual Technology Tags



The most advanced technology on the market, SALUS asset tags can now operate on Bluetooth-Low Energy (BLE) and Long Range (LoRa) signaling simultaneously within a single 2.4GHz radio hardware device (Tag). This is the most advanced technology on the market, offering increased accuracy when needed while lowering operational costs. It further allows site operators to use an application on a smart phone as a localised asset locator making it ideal for small items like tools and equipment that may be stored in racks, etc.

Intelligent Tag (i-Tag)

Intelligent Tags (i-Tags), provides further cutting-edge functionalities in addition to standard tags. It enables a direct 2-way message interface to the tag/operative via application-driven process rules (e.g., return this tool for calibration) or autonomously via environmental/location-based parameters (e.g., this device is not allowed outside these boundaries), further adding value especially in safety critical environments.



SALUS System Specification

1. Scalable to large deployments with thousands of devices
2. Quick and easy to install
3. Location:
 - *Can achieve <2 Metres accuracy*
 - *Works across multiple floors (3D) in difficult indoor environments*
4. Anchor Density:
 - *In general, 1-2 anchors required per room to increase precision.*
 - *Max anchor line of sight range <200m (outdoors)*
5. Anchors can be operated by battery (rechargeable), solar or Power over Ethernet
6. Ease of Use:
 - *Easy to install, setup and configure via mobile app*
 - *Current installations 1 to 2 days*
 - *Including training personnel*
7. Low power and long-life battery operation makes installation and management quick and easy
8. Offers payback within one year

[Scan the QR code to watch the SALUS explainer video](#)



To trial the functionality of a fully featured pilot system, or to schedule a live demonstration of the SALUS system, please contact:

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