Intelligent Railways via Integrated Satellite Services (IRISS)

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Challenges & Objectives

Industry Challenges

- To increase **Capacity** (more passengers, more trains)
- To reducing **Carbon** (reduce fuel)
- To lower the **Cost** of operations (running, maintenance)
- To improve **Customer** Satisfaction (reduced delays)

Our Objectives

- To generate better **driving** style
- To deliver better **information** to support decision making
- To improve the **reliability** of trains
- To provide up-to-date, accurate **timetable** information

Project Goals

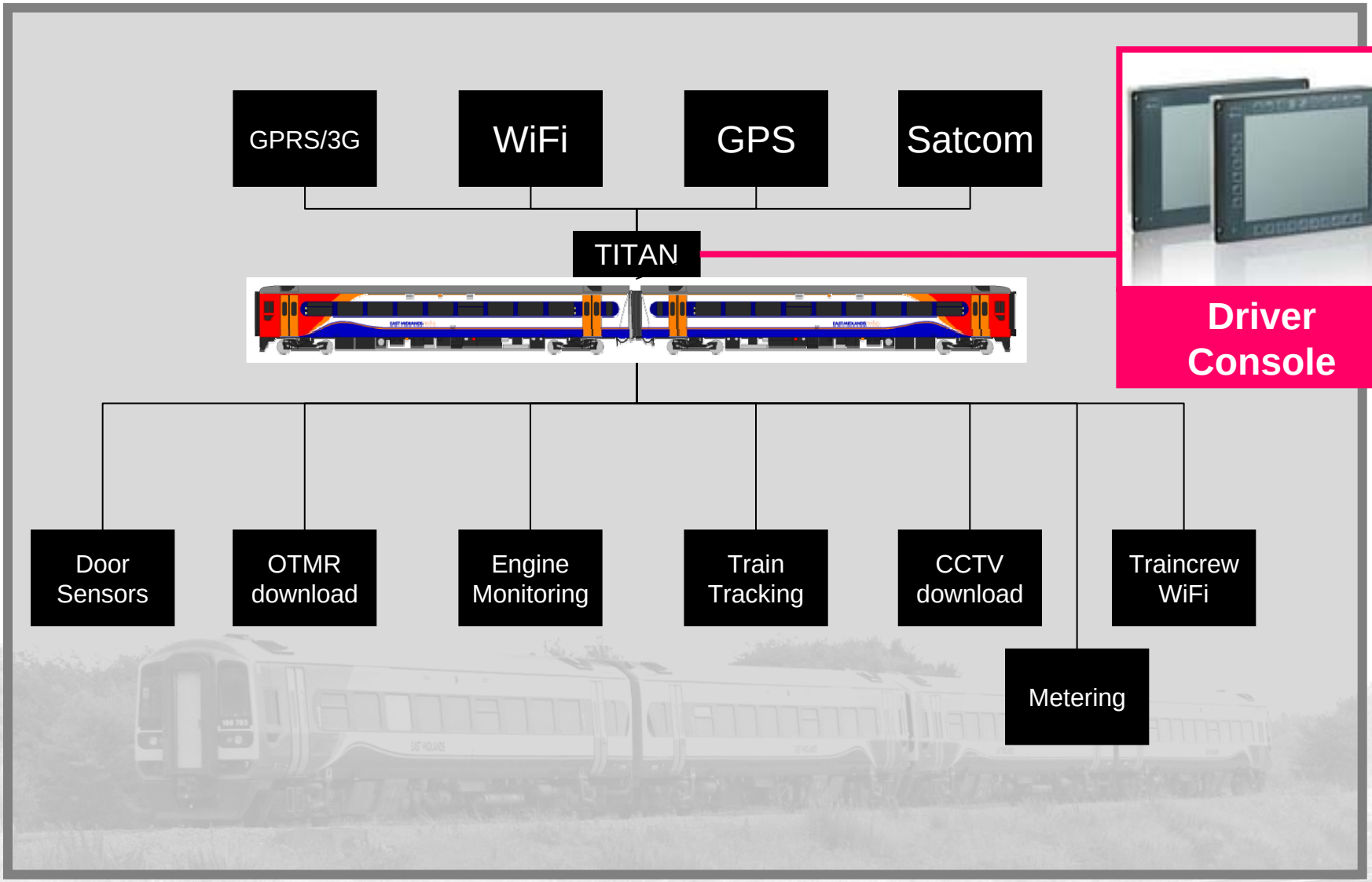
- **Single, seamless** communications and navigation portal per train, including ontrain system, communication services and back-office utilities

- Provides **two-way communication** services serving multiple ontrain systems with **different bandwidth** requirements

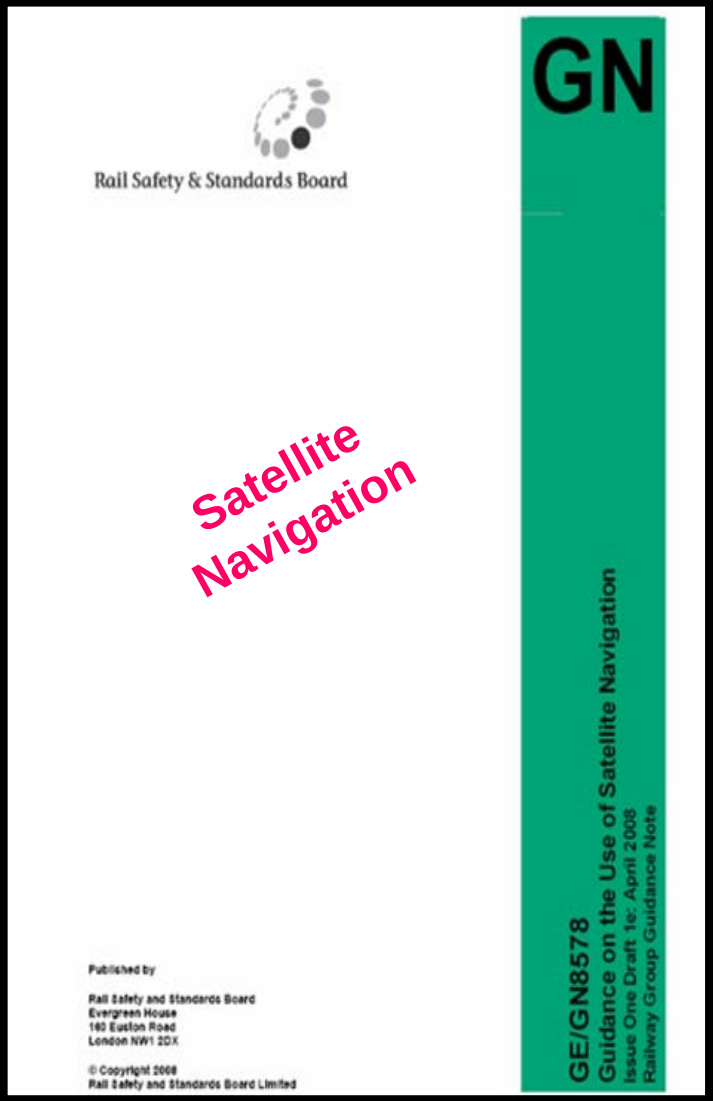
- Provides **accurate train Position, Velocity, Time, Distance and Bearing** to back-office and **provides interface** to other ontrain systems

- Serving multiple **applications and services**
  - Ontrain and back-office
  - Real-time, offline

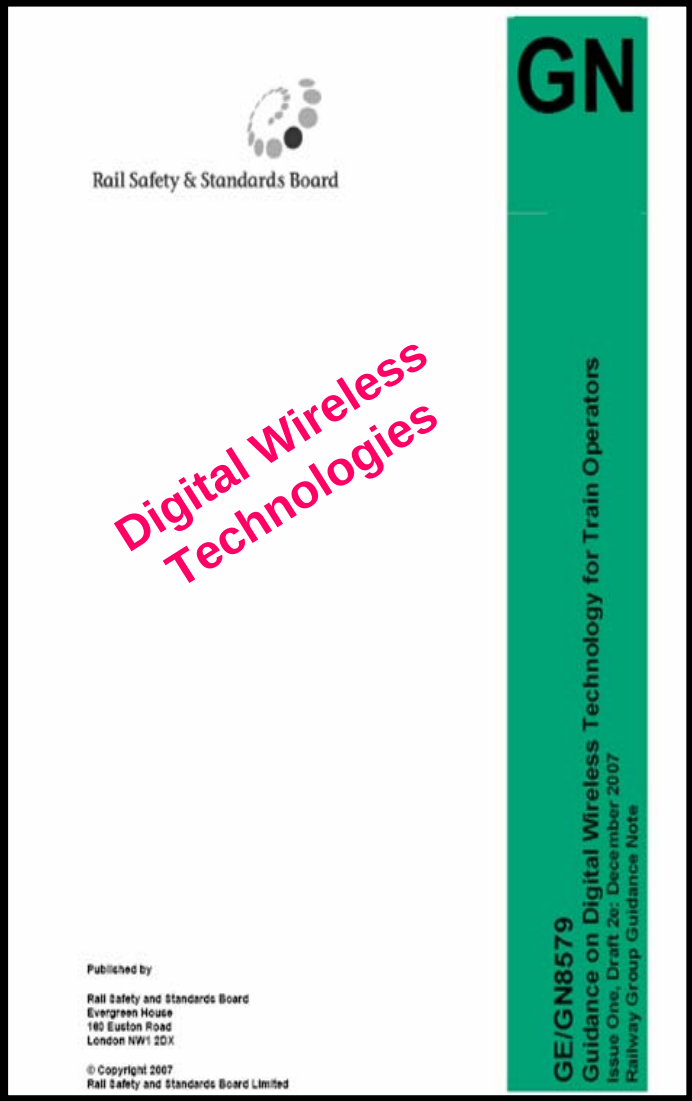
Overall Concept



Supporting Guidance

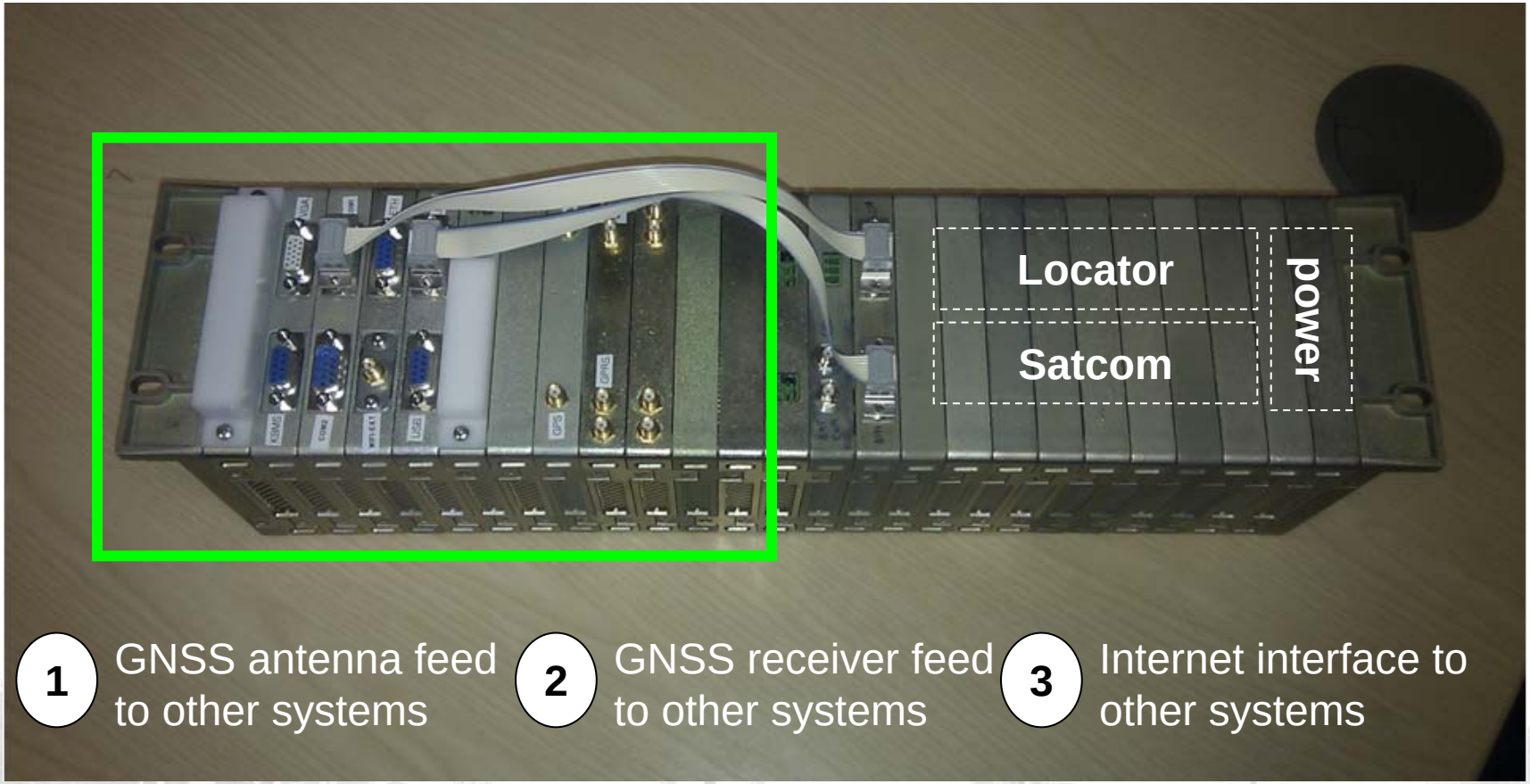


Satellite Navigation



Digital Wireless Technologies

TITAN Universal Portal



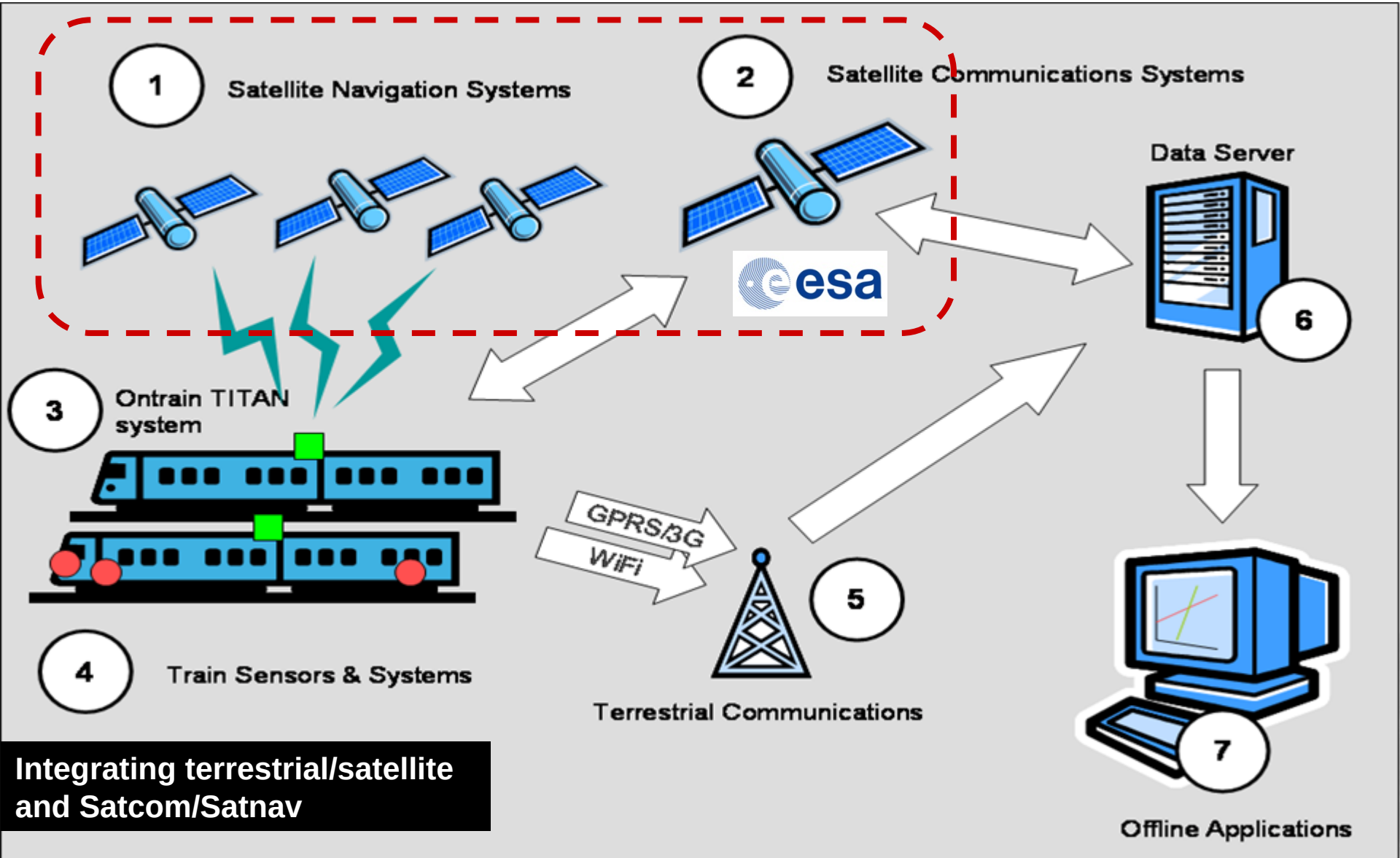
Sponsors & Stakeholders

- European Space Agency (ESA)

- East Midlands Trains / Angel / Porterbrook

- Future Communications and Positioning Systems Working Group (FCPS)

System Architecture



Integrating terrestrial/satellite and Satcom/Satnav

Trains & Routes

Class 158

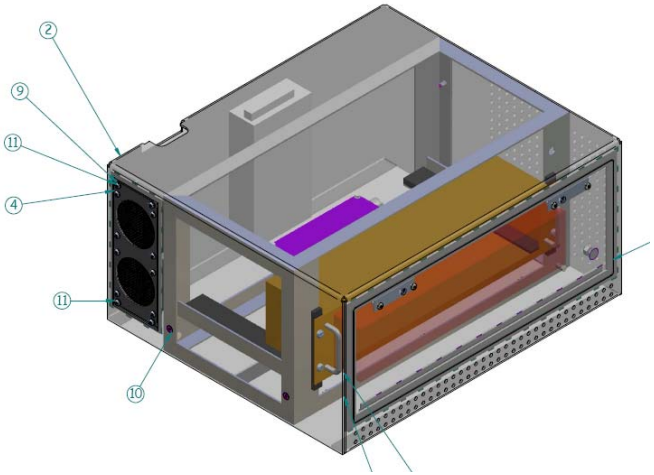
- Rural routes (extensive)
- <90 mph
- Many stations
- 15–25 years old
- Angel Trains Finance

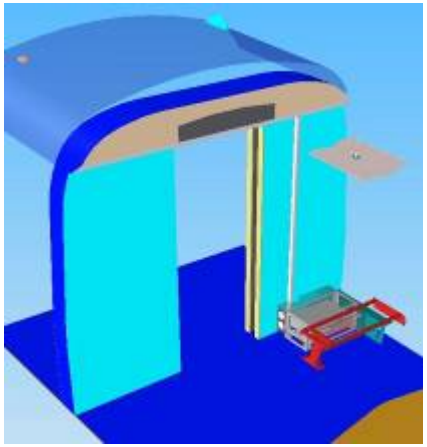
High Speed Train

- Mainline Routes
- 125 mph
- Leeds - London
- 15–25 years old
- Porterbrook Rail Finance

Testing & Approvals

Internal Installation





External Installation

GPS, GLONASS, Galileo, GSM, WiFi Antenna

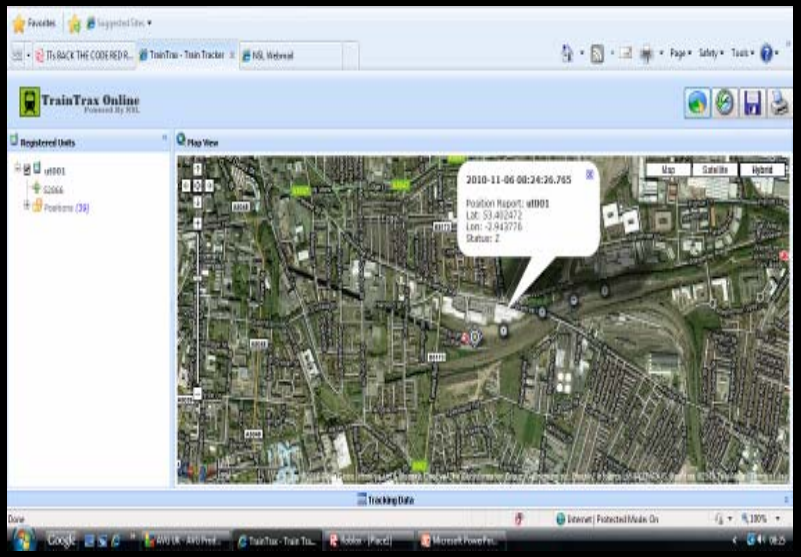
Iridium SatCom Antenna

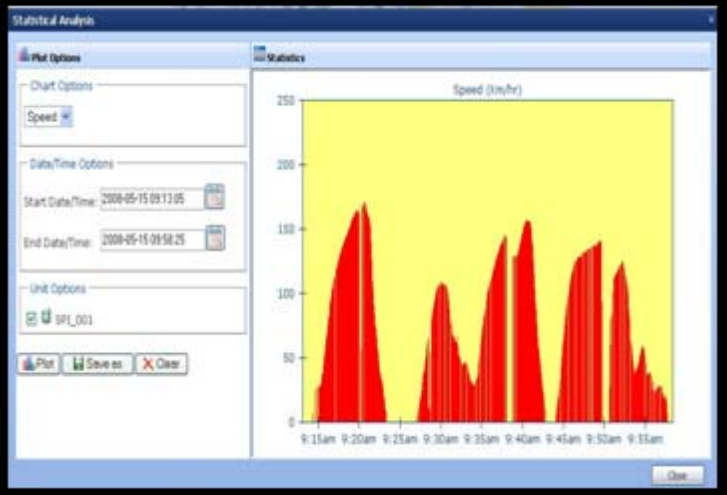
- External antennas fitted off centreline of vehicle
- GPS antenna is 0.5m from internally mounted GPS antenna for CCTV
- And at least 1m away from the future GSM-R antenna fitment

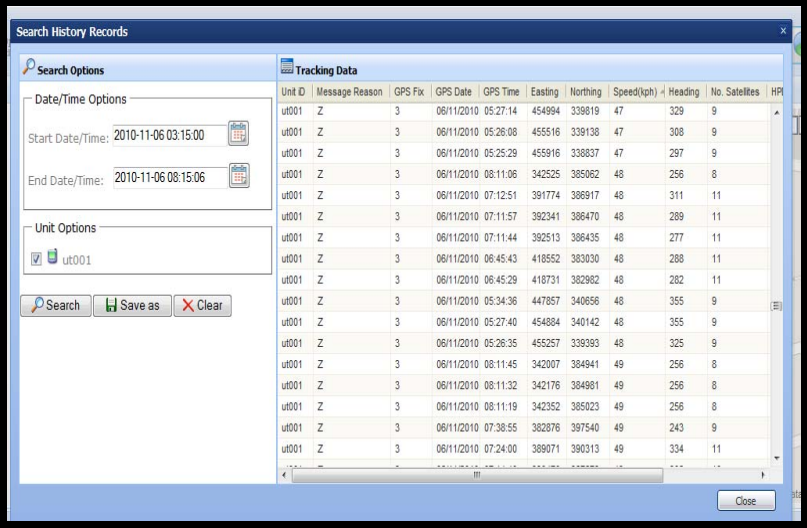
IRISS Applications

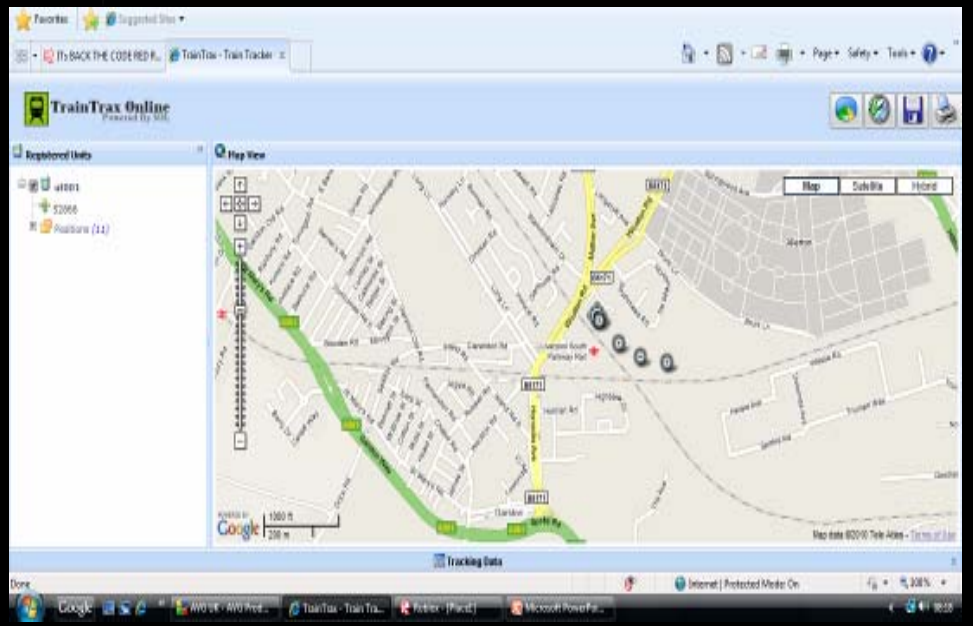
1. OTMR download
2. CCTV download
3. Image extraction
4. Ontrain Metering
5. Train Tracking
6. Driver Monitoring
7. WiFi Paging / Messaging
8. GNSS feed

TrainTrax ("GPS Train Tracking")



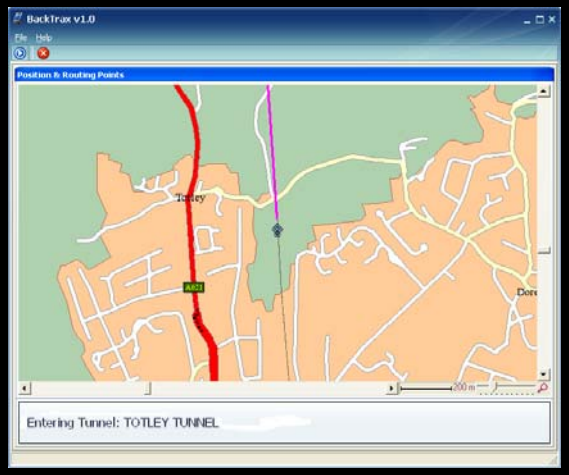




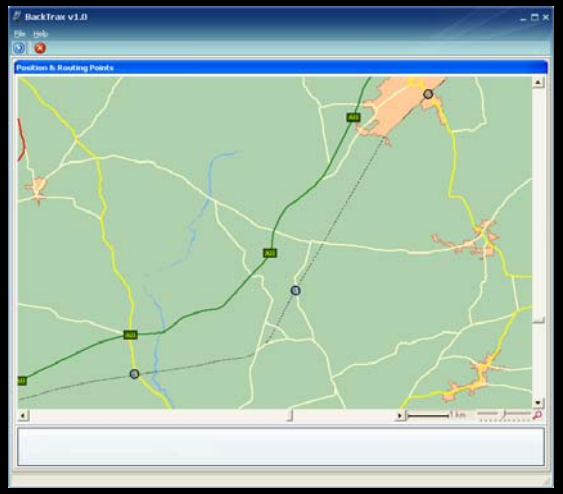


NavTrax ("SatNav for Trains")

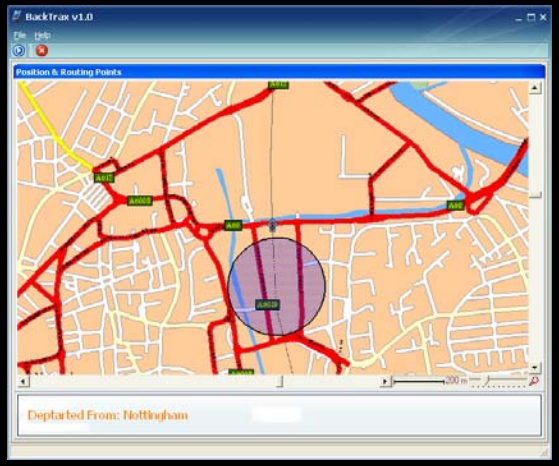
Entering "zones of interest"



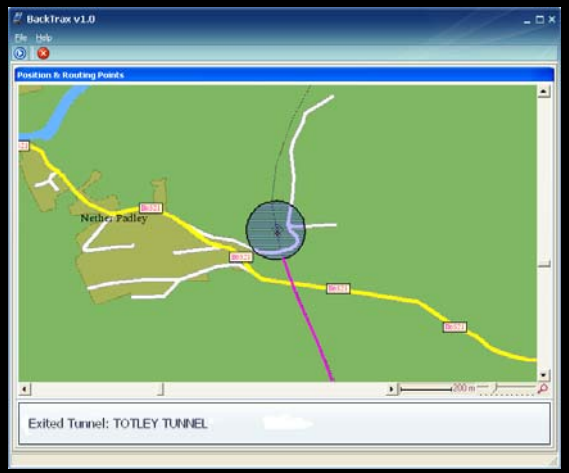
Entering "sections of interest"



Virtual TRUST points



Exiting "zones of interest"



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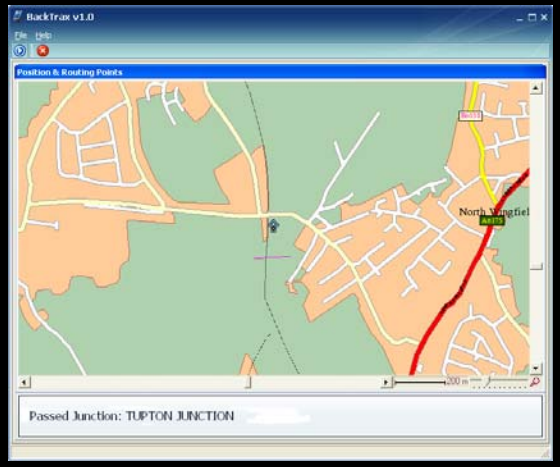
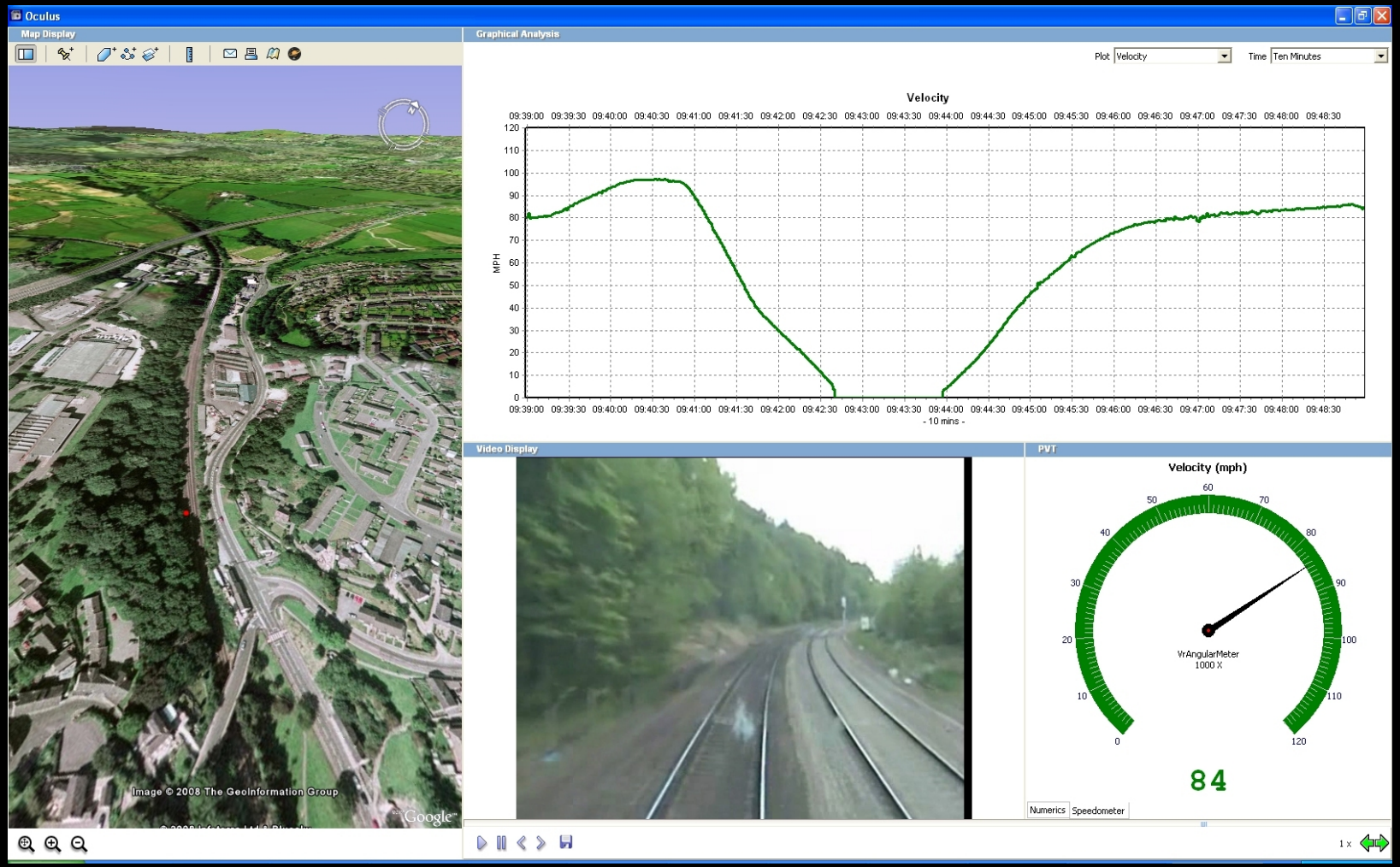


"points of interest"

Driver Training



Expected Benefits

- Better information to **customers**
- Improved maintenance (**records & alerts**)
- **Reduced** cancellations & delays
- Enhanced **Performance**
- Moving to **condition-based maintenance** regime
- Better **use of energy / fuel**
- Alerts of points of poor infrastructure (ie **repeat faults**)
- **Elimination** of manual downloads
- Information **on-demand** (support decision making)

thank you