



Intelligent Railways via Integrated Satellite Services (IRISS)

Mark Dumville

Nottingham Scientific Limited (NSL)



UK Rail Industry



Department for
Transport

Infrastructure
Operator

The logo for Network Rail, consisting of the text "Network Rail" in a blue, sans-serif font above a red graphic of three diagonal lines.

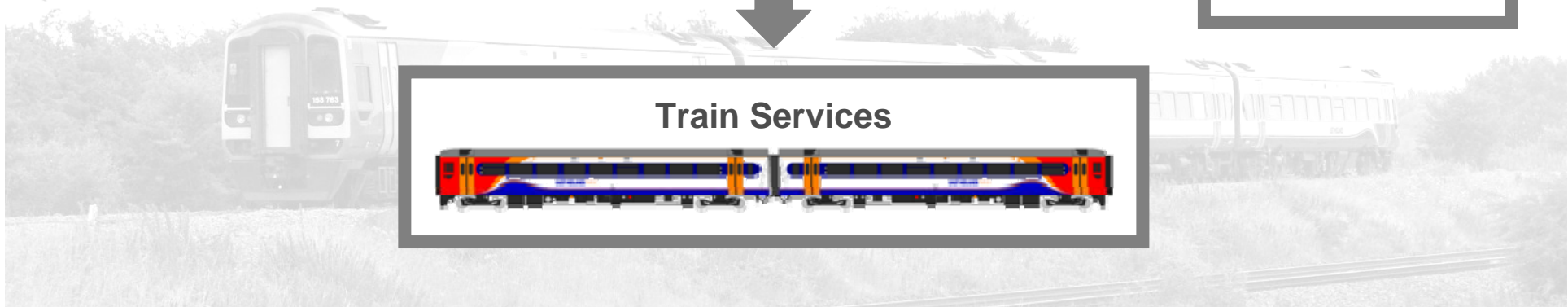
Train Operating
Company



Rolling Stock
Companies

The logo for Porterbrook Rail Finance, featuring a purple stylized train graphic above the text "PORTERBROOK Rail Finance".
The logo for HSBC, consisting of the text "HSBC" in a black, serif font next to a red and white hexagonal logo.
The logo for angel, consisting of the word "angel" in a black, lowercase, sans-serif font with a teal circle below the 'l'.

Train Services

A photograph of a modern, high-speed train (likely a Class 350) in blue, red, and white livery, viewed from a side-on perspective.

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



IRISS Project Overview



- **Single, seamless** communications and navigation portal per train, including ontrain system, communication services and back-office utilities
- Provides **two-way communication** services for multiple ontrain systems and different bandwidth requirements
- Provides **accurate train time, location and speed** to back-office and provides feed for other ontrain systems
- Example **applications and services** include:
 - CCTV
 - Ontrain Sensors
 - Ontrain Data recorders
 - Fuel metering
 - Passenger Information Systems



Industry Partners & Profiles



- **Nottingham Scientific Limited**
 - Ontrain system, Back-office utilities
 - Approvals
- **Avanti Communications**
 - Communications services and Server
- **AST Rail**
 - Installation design and enclosures
 - Installation methodology
- **SCISAT**
 - Applications, Requirements & Markets



Users & Stakeholders



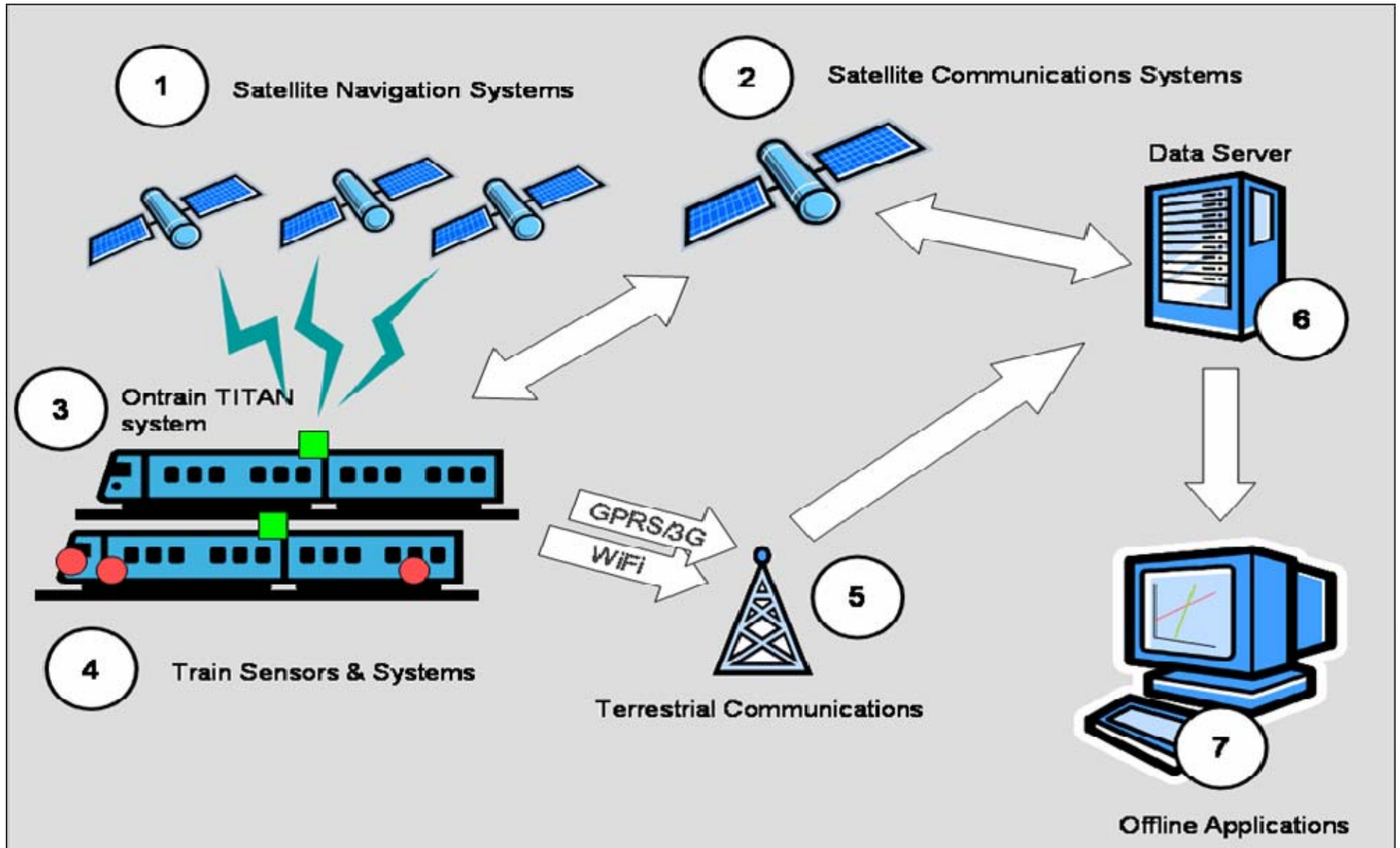
- East Midlands Trains / Stagecoach Group / Porterbrook



- Future Communications and Positioning Systems Working Group (FCPS)



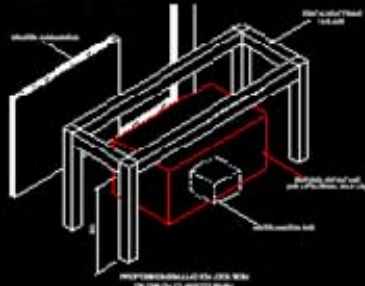
IRISS System Architecture



Ontrain Equipment



Installation design



Partially Installed

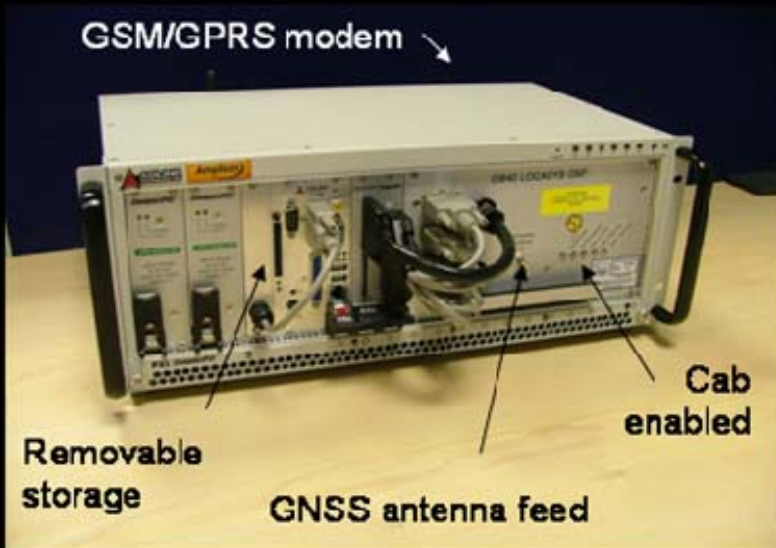


Fully Installed



GNSS Antenna

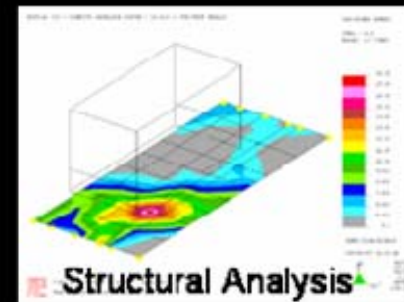
GSM/GPRS modem



EMC certification



EMC Testing



Structural Analysis

Trains & Routes



Class 158

- Rural routes
- Low Speeds
- Many stations
- 15–25 years old



High Speed Train

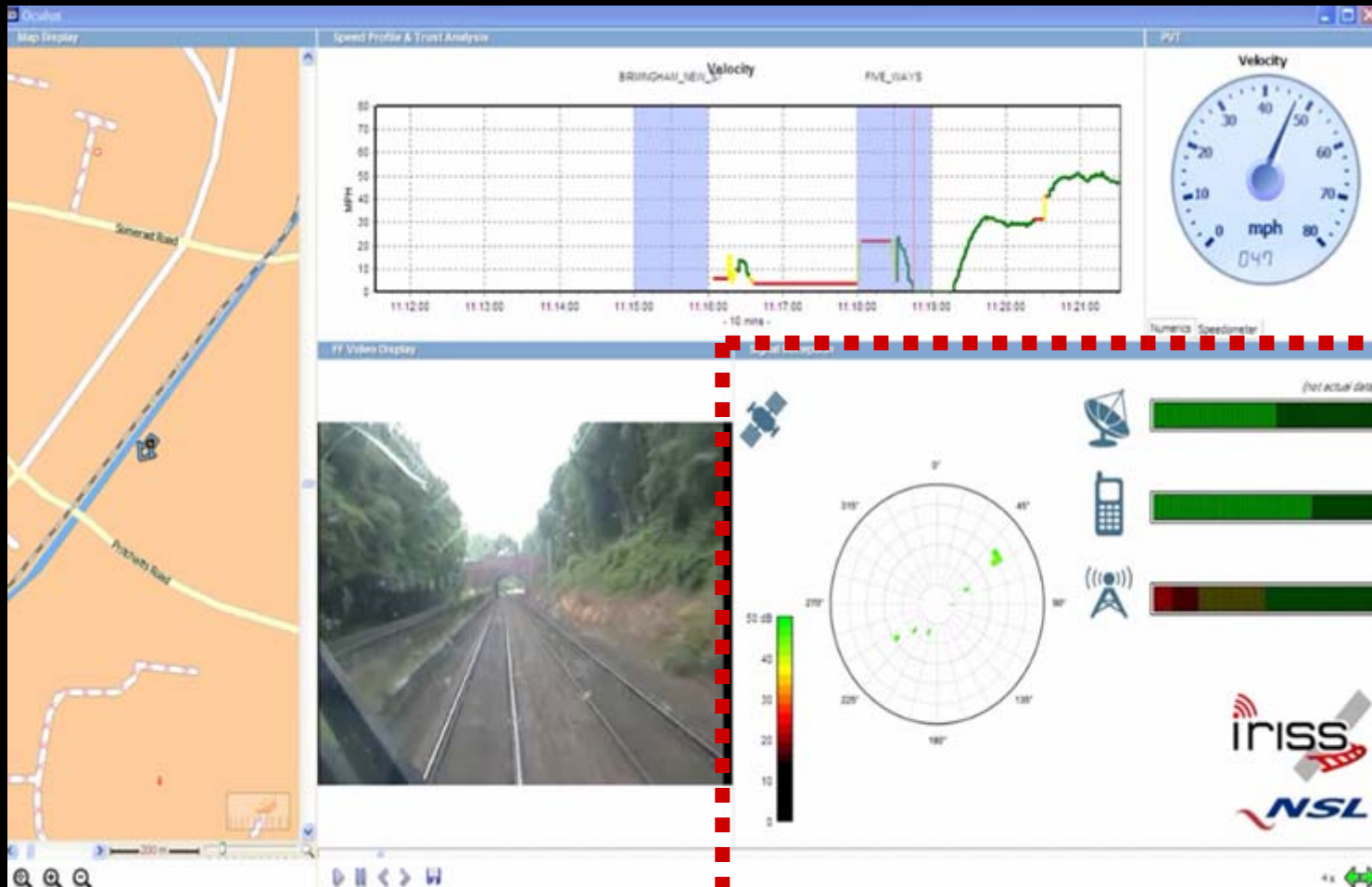
- Mainline Routes
- 125 mph
- Leeds - London
- 15–25 years old

Performance Analysis Tools



1. Sensor Condition

2. Gauges



5. Mapping

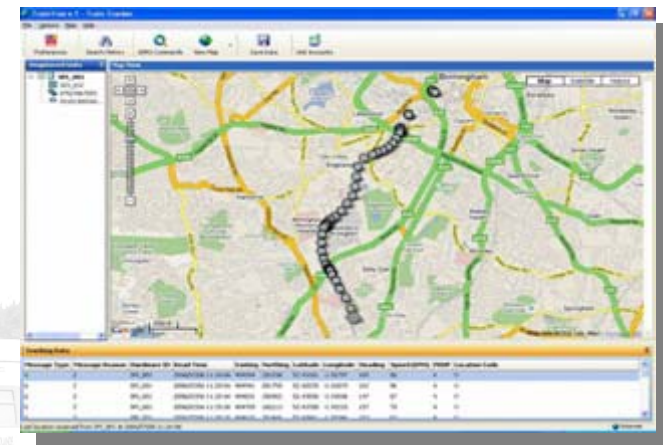
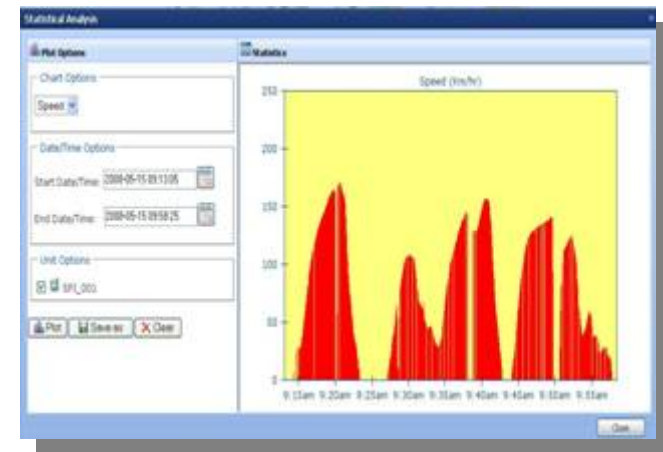
4. FFCCTV

3. GNSS/Satcom/3G/WiFi

IRISS Back-Office Utilities



Train Performance Monitoring
"OCULUS"



Tracking Status and Timetable
"TrainTrax"





IRISS Applications

- Passenger information systems / customer information systems
- Download of ontrain monitoring recorder / engine management system
- Fleet management
- Driver style monitoring
- Energy management
- Low-bandwidth upload (to ontrain PDA)





IRISS Benefits

- **Reduced** cancellations & delays
- Better information to **customers**
- Improved maintenance (**records & alerts**)
- Moving to **condition-based maintenance** regime
- Better **use of energy/fuel** (eco-driving)
- Alerts of points of poor infrastructure (ie **repeat faults**)
- **Trending data** (ie, early warning of failure)
- **Elimination** of manual downloads (ie CCTV, OTMR)
- Information **on-demand** (support decision making)





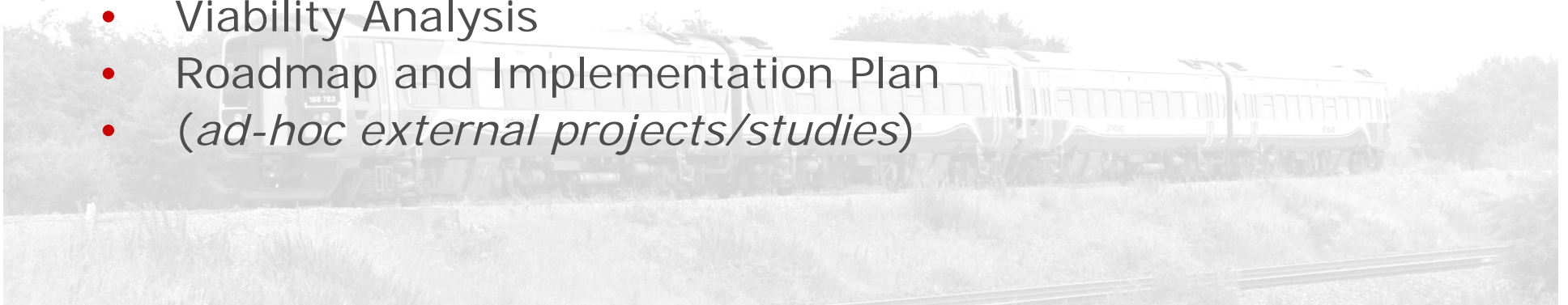
IRISS Project Status

Pre-Feasibility Study (2009)

- Applications Analysis & Requirements Definition
- State of the Art
- Business Appraisal

Feasibility Study (2010)

- Applications Analysis & Requirements Consolidation
- State of the Art
- System and Service Definition
- Proof-of-Concept (real-world trial)
- Viability Analysis
- Roadmap and Implementation Plan
- (*ad-hoc external projects/studies*)



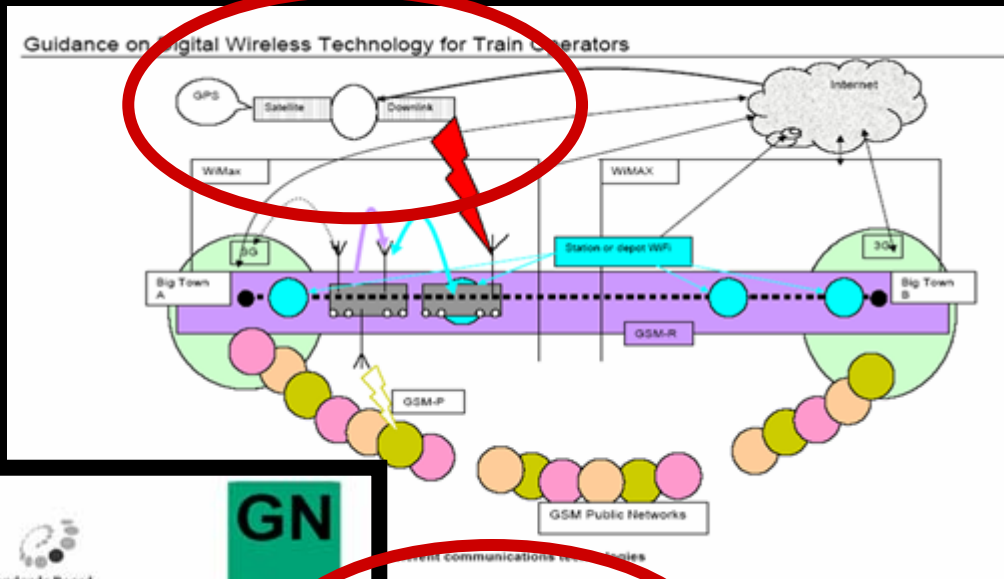


thank you

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Industry Guidance



Rail Safety & Standards Board

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