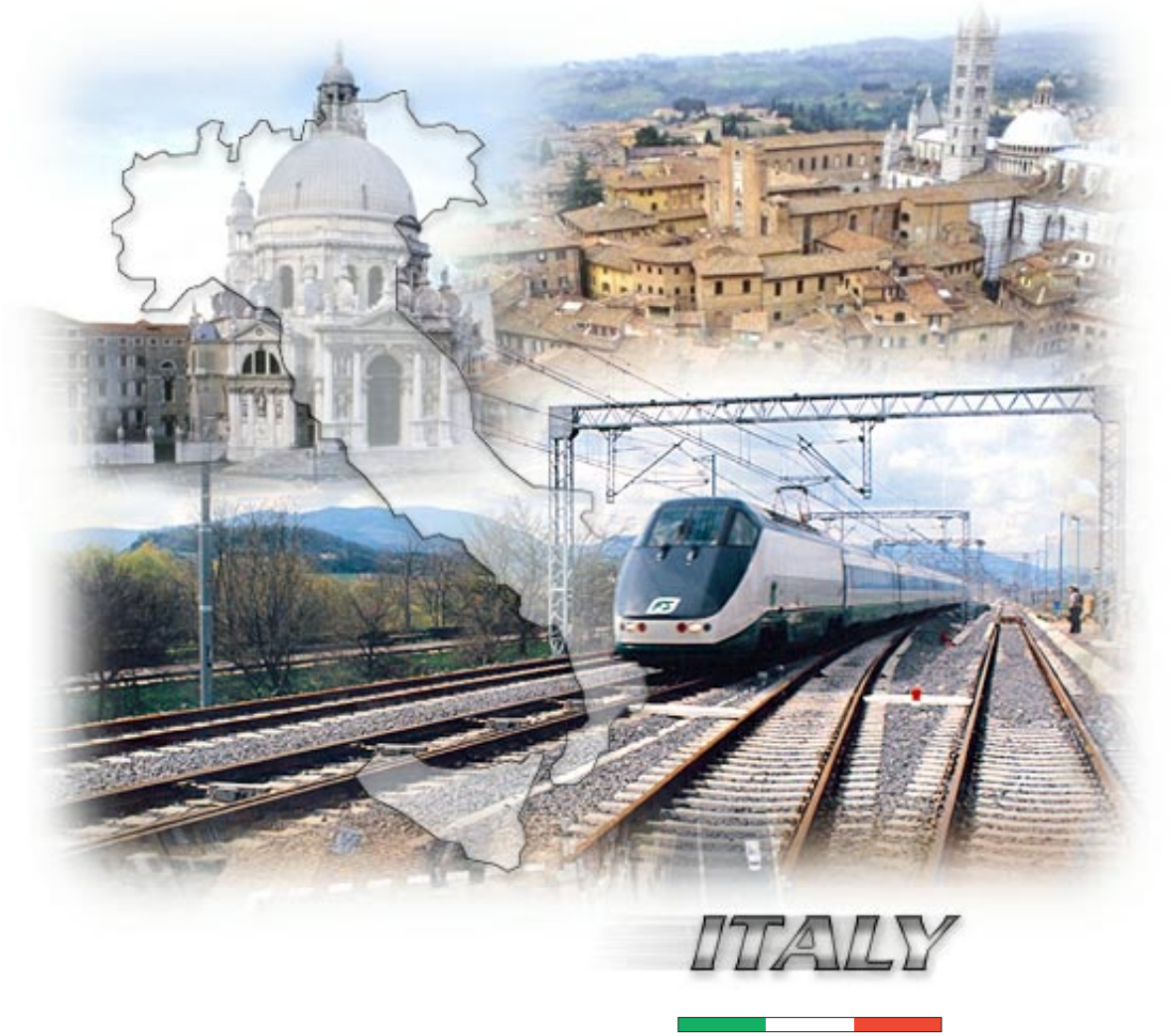
FAIVELEY TRANSPORT

The DIS Project Story

Italy moves ahead in the field of safety



Summary

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1 - The Customer:

TRENITALIA, Italy's National Railway company.

2 - The Challenge:

To provide TRENITALIA with a Driver Information System to increase the security of the Italian railway networks.

Background:

Safety is given absolute priority by TRENITALIA, not least to offset the network deterioration and the increase in breakdowns, but also to reduce the technological gap. Safety, the hub around which spins the entire railway transport system,

represents a crucial success factor to the Company's strategy. TRENITALIA therefore needed a system that could help analyse incidents to prevent accidents over the long-term. This system needed to include:

- data storage and analysis for juridical investigation,
- data storage and analysis for driver supervision,
- data storage and analysis for advanced maintenance,
- speed and position processing,
- wireless on-board software up dating.

3 - The solution:

In February 2000, TRENITALIA selected the Faiveley, ANSALDOBREDA and F.A.R. System consortium to supply a complete **Driver Information System** for the Italian railway network. Faiveley is consortium leader for this project which involves retrofitting all existing systems on the TRENITALIA's 2400 engines; the project itself is worth 40 million Euro with 15 million supplied by Faiveley. This Driver Information System, incorporating Europe's most advanced tachometry and data recording technology, will be one of the first in the World to have a wireless information download.

3.1 - Consortium company profile:

FAIVELEY:

As consortium leader, Faiveley is the designer and manufacturer of the turnkey tachometry and data recording solution including a kaleidoscope of services, support and training. With over 80 years of experience in international project, the company's expertise in installing such systems in the harsh railway environment is a major advantage for TRENITALIA. Faiveley's also has a substantial on-site sales and after sales service team in Italy, and a thorough knowledge of the Italian railway network.

ANSALDOBREDA:

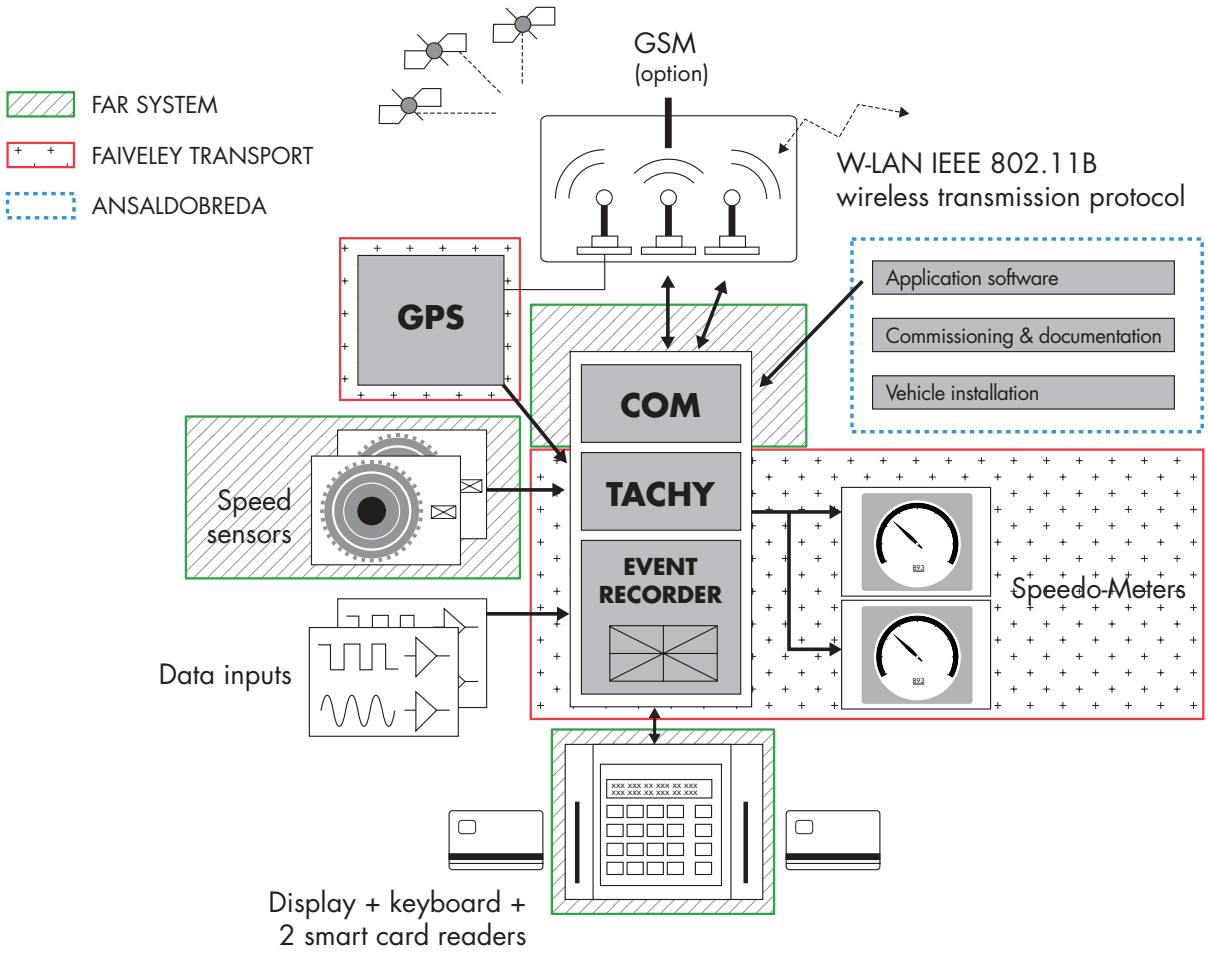
ANSALDOBREDA is a major supplier of turnkey transportation systems. Its signalling and train control systems have contributed to the constant improvement in railway safety throughout the world. The company's knowledge of the Italian market and its on-site customer services team, are essential for the well functioning of the consortium. As well as developing software, ANSALDOBREDA is also in charge of the installation, commissioning and on-site logistics.

F.A.R. System:

F.A.R. System based in Northern Italy, is renowned for its supply of exclusive, high-tech microelectronic solutions. F.A.R. Systems is the perfect partner for the Italian DIS project due to its knowledge of on-board train communication protocols and its ability to offer innovative solutions. F.A.R. System is the designer and producer of the on-board and ground wireless equipment.

3.2 - Work sharing:

Faiveley and its consortium partners ANSALDOBREDA and F.A.R. System are supplying products and services in their own specialist areas:



3.3 - Driver Information System technical description:

• On-Board equipment:

Tachometry system and event recorder

The heart of DIS system: Faiveley's tachometer and event recorder

The tachometry solution chosen for this Italian project comes from Faiveley's TOM product range and already complies with the environmental requirements of the future trans-national ERTMS signalling system. This system is undeniably the manager and guardian of all the safety critical train system data and performs the following four essential functions:

• Speed and signal processing:

The DIS processes the signals coming from the speed sensors, calculates the speed information and drives the stepper motor speedometers. The speed computer is based on a 2-way independent measurement system, to increase security.

• Data recording:

The DIS functions as a train data event recorder with a flash memory storage capacity of at least 10 hours. This allows recording for judicial investigation, for advanced maintenance and for driver supervision as the DIS collects data describing driver movements and behaviour during a pre-identified mission. Stored data is fully protected against up to 2 tons of crushing force and 700°C/5 mn of fire.

• *COM Board:*
This board has two main functions: it is used to establish the connection for wireless data transmission (IEEE 802.11B) and as an operating memory. The data storage has two facilities: the storage of non-protected data and a temporary backup for wireless transmission.

• *Dead man surveillance (optional):*
For cost optimisation, the DIS is the ideal equipment for monitoring driver vigilance. The on-board dead man surveillance system, otherwise known as VACMA (Veille Automatique avec Contrôle de Maintien d'Appui), detects driver vigilance through a pedal and/or a switch and controls the warning horn and emergency break in case of an incident.

The DIS antennae

The DIS antennae are housed in the same casing. The W-LAN antenna is used for the wireless data transmission, while the GPS antenna and receiver decode train position in real time and resynchronise the DIS clock. The information from the antennae can be used to ensure safer and more comprehensive operations and to refine the analysis of data following a crash.

Terminal and smart card reader

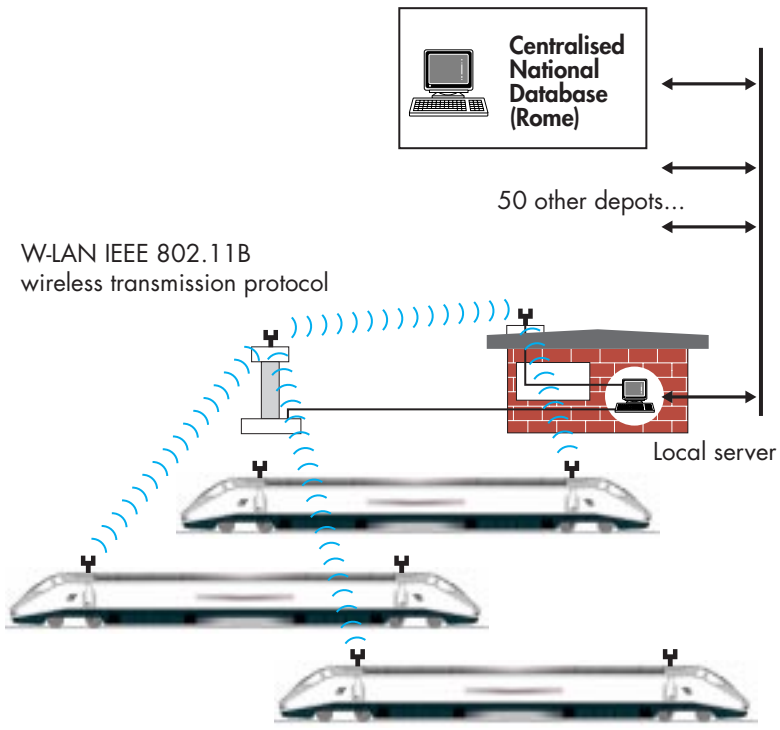
The DIS includes a keyboard/screen terminal with a double smart card reader, secured to the driver's desk (a double smart card reader is provided as Italy is one of the only countries in Europe to use 2 drivers on a locomotive). The system recognises the drivers' ID and journey parameters once the smart card has been inserted into the terminal and allows for driving licence management. This terminal is also used by the maintenance teams to access technical parameters.

• Depot equipment:

The depot for the DIS project has to be equipped for train data downloading. The antennae that are used, are installed on the roofs of buildings that have been carefully selected to assure a complete cover. These antennae are extremely solid and designed to resist the harsh elements of the railway environment (dust, snow, ice, sun etc.). Their installation is carried out by skilled technicians who have many years of experience of working in the hazardous railway environment (high voltage etc.).

How the system works:

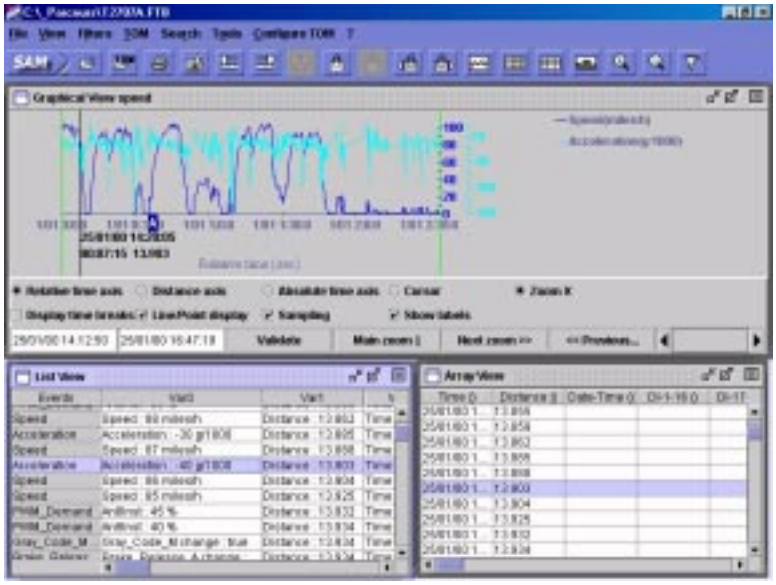
When the trains arrive at the depot under the covered area, the whole contents of the black box are downloaded via a high-rate wireless link known as W-LAN (IEEE 802.11B protocol). The information is downloaded onto a local server that is in turn connected to the WAN of the Italian Railway network.



• Faiveley's Software for Analysis and Maintenance (SAM).

To accompany the on-board equipment, Faiveley provides a Software for Analysis and Maintenance (SAM) which, when connected to the black box, can be used by judicial experts for data analysis. SAM can carry out the following functions:

• real-time, multi-mode graphic display of information and recorded data,
• sophisticated search,
• maintenance data management,
• user-friendly report writing,
• equipment configuration management,
• calculation of the recording capacity with the Journey Capacity Analyser.



An example of a Software for Analysis and Maintenance (SAM) screen

3.4 - Customer benefits:

The DIS solution provides TRENITALIA with numerous benefits, which will help them to reduce costs and increase railway network efficiency and security.

- Operational economy:
  Due to Automatic Wireless Data downloading, technicians no longer need to go on-board the train and download information. Information transfer is facilitated as there is no need to search for electrical cables or connection points and the transfer speed is faster.

- Increased railway network security:
  The improved quality and quantity of fundamental and safety critical information helps the analysis of incidents to prevent accidents over the long-term.

- Full data protection:
  The ‘black-box’ is crash resistant with a reinforced structure that can withstand high temperatures, shock, and noxious fluids such as alcohol, acids or fire-fighting foams. All of the data is recovered for comprehensive analysis no matter how severe the accident.

- Limited train immobilisation:
  The system has been designed for easy installation during a retrofit so that train immobilisation is limited. This is achieved thanks to advanced system integration, mechanical versatility, and easy connection.

- Driver surveillance:
  The surveillance of all drivers on the TRENITALIA railway network is considerably improved as all information is rigorously recorded and stored for analysis at a later date. This system also helps driver licence management by for example, preventing a driver with the wrong driver licence level from starting a mission.

- Cost effective access to driver missions:
  The DIS provides efficient access for the driver via the smart card badge system. This offers instantaneous and reliable identification of the driver and the mission.

- Flexible architecture:
  The DIS is a flexible system that can easily be upgraded should the client decide to adapt the existing equipment to evolving train specifications at a later date; for example TRENITALIA has decided to equip some of the rolling stock with the dead man surveillance system. The flexibility of the DIS is further illustrated by the fact that the system is being used on all types of trains as boards can easily be added or taken out to increase or decrease processing capacity. This ensures coherency throughout the Italian network.

3.5 - Project progress as of September 2001:

The Italian DIS project is perfectly on schedule and as of September 2001, 16 of the depots have already been equipped. These include Verona, Bologna, Milan, Torino, Genoa, Florence, Rome, and Naples. As far as on-board equipment is concerned, 30 (8 different types) of the 2400 systems have been installed, and work is continuing at a rate of 70 systems per month being installed over 3 years.