



Technical solutions for train refurbishment



INTEGRATION



AUTOMATION



COMMUNICATION



SAFETY



Refurbishment solutions

Modernizing your trains is often the most pragmatic choice. Research shows it requires a lower investment and lower annual costs than new trains. Yet it enables you to improve the comfort and safety of passengers as well as improving train maintainability and operational efficiency.

When performing a fleet overhaul, the integration of new technologies with existing onboard systems is pivotal. There is often a large number of sub-systems,

from different providers, using different technologies which create communication and interoperability challenges.

Trainnet® is an open, modular and versatile train computer, designed to overcome those challenges. It provides integration, automation, diagnostics, communication and

safety solutions for your rolling stock refurbishments. This document introduces 13 of the main solutions offered by Trainnet®.

INTEGRATION

Communication and interoperability between new technologies and existing onboard systems is one of the major challenges of refurbishment projects. EKE's knowledge and Trainnet® technology enables you to keep using what works well in your trains and add up new functionalities.

1 Train and vehicle bus

Build a new train bus, ethernet train backbone or vehicle bus, to replace or support the existing train bus. A new Train Communication Network (TCN) can provide the necessary bandwidth, redundancy or features required to improve the train.

2 Gateway

Integrate new systems via a tailored Gateway and/or Ethernet Switch. The Trainnet® train computer is modular and you can freely choose from a large range of interfaces including WTB, MVB, CAN, Ethernet and Serial Links.

3 Redundancy

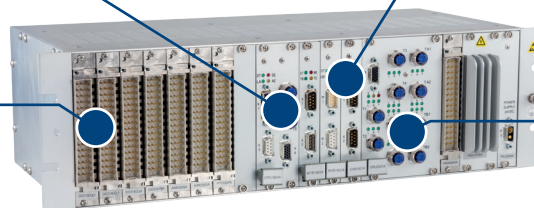
Implement redundancy at both the Hardware and Software levels: when a system fails another automatically takes over, thus improving reliability and maximizing train availability.

PROCESSORS

- Processing power
- GPS, Wi-Fi, LTE connectivity
- Graphical display controller
- Event recorder capabilities

INPUT/OUTPUT INTERFACES

- Digital inputs/outputs
- Analogue inputs/outputs
- High speed analogue inputs
- Digital relay outputs
- Pt-100 temperature sensor inputs



Trainnet® modular train computer

BUS INTERFACES

- Wire Train Bus (WTB)
- Multifunction Vehicle Bus (MVB)
- CAN and CANopen
- Serial Links

ETHERNET SWITCHES

- Ethernet Train Backbone (ETB)
- Ethernet Consist Network (ECN)
- Ethernet switch and/or router
- Power-over-Ethernet

AUTOMATION

Trainnet® can take care of the automation of new systems added during the overhaul as well as older systems already on board. Trainnet® can act as a Train Control and Management System (TCMS) and manage the entire train.

4 Control and monitoring

Control and monitor new and existing onboard systems. Trainnet® can exchange commands, diagnostic or any other information with connected onboard systems. Appropriate sensors and inputs/outputs can be added for improved control and monitoring.

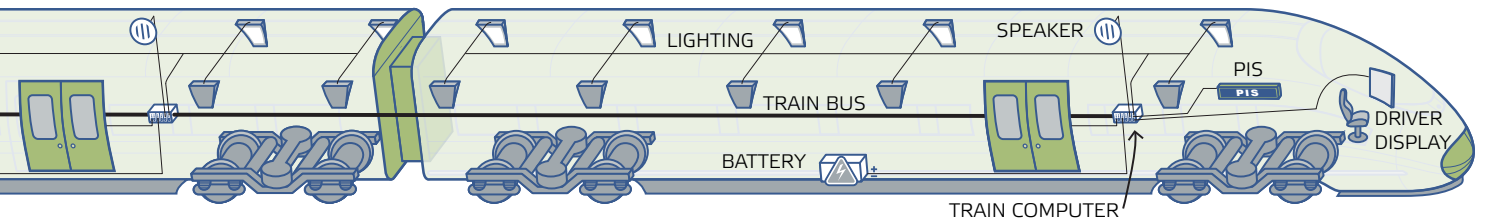
5 Automation

Trainnet® can be programmed to simplify rolling stock operations. Automatic train inauguration, automatic brake testing or door management are a few examples of applications. You are free to develop the Software yourself or let EKE do it for you.

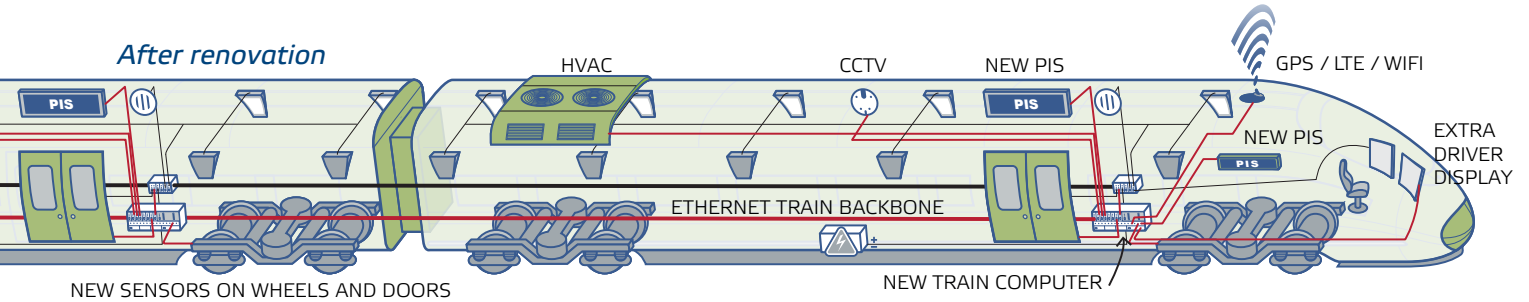
6 Cross-system automation

Trainnet® enables cross-system automation for improved efficiency and safety. For example, smoke detection would automatically make the HVAC stops blowing air in the fire area, cut the 240 V power off and switch on the battery safety lights.

Before renovation



After renovation



DIAGNOSTICS

Diagnostic information gathered from Trainnet® itself or from connected sub-systems can be sent to the train driver and to the wayside.

7 In the train

Informations such as sub-system statuses or recorded passenger behaviors can be analyzed and presented in the form of alarms, advices or informative charts to the driver.

8 Remote monitoring

The SmartVision™ Remote Condition Monitoring System (RCMS) enables fleet-wide data collection. The train status, location and diagnostic information gathered remotely help to improve maintenance, processes and operations.

COMMUNICATION

Beyond its Train Communication Network function, Trainnet® can also enable communications to people inside and outside the rolling stocks.

9 Train-to-wayside

Trainnet® can integrate GPS, LTE and Wi-Fi capabilities for Train-to-wayside communications. Train location and diagnostic data can be sent to depot or to remote condition monitoring centers.

10 PIS/PA

Trainnet® can be used as Passenger Information Systems (PIS) and Public Announcement System (PA), sharing travel information and safety messages via displays, line maps, loud speakers and mobile devices.

SAFETY

One of the key reason to conduct a train overhaul is to improve train safety with the latest innovations and to match new legal requirements. Trainnet® helps you to improve safety onboard.

11 SIL Applications

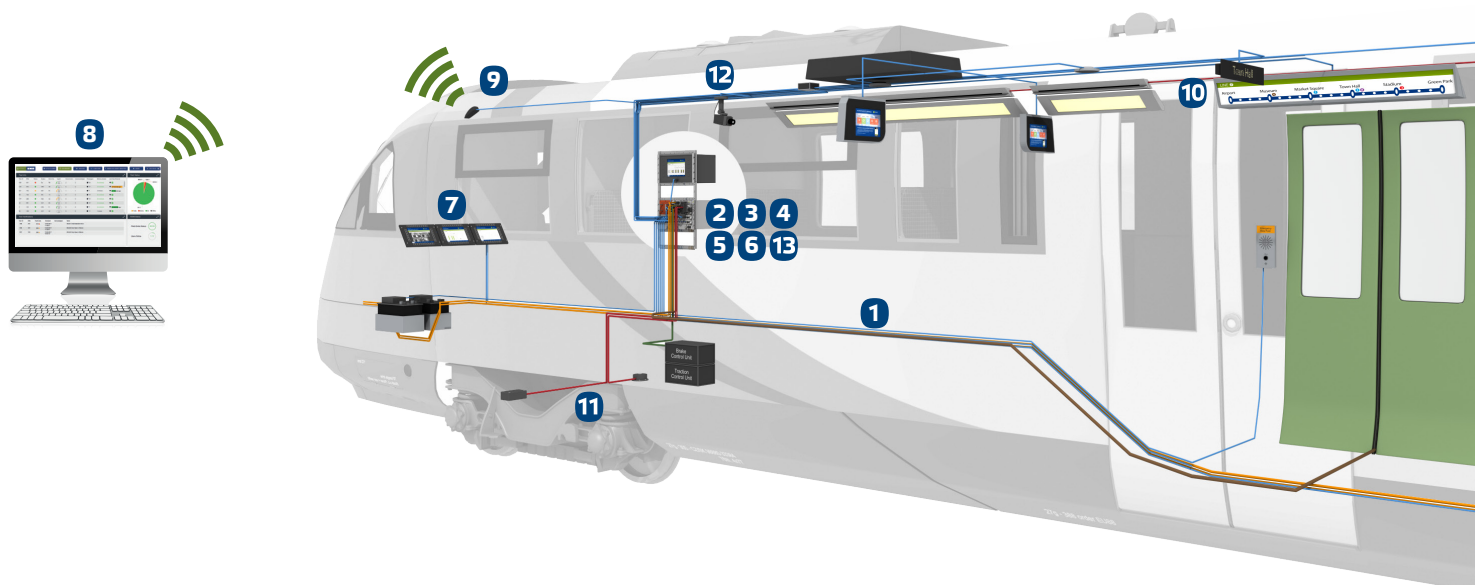
Safety Integrity Level (SIL) functions can make your train safer. The following applications are available up to SIL-2: speed measurement, temperature measurement, fire detection and door operation (ASDO). Ask us for more.

12 CCTV

Trainnet® can fully integrate and control CCTV systems, including cameras and Digital Video recorders. A video monitoring display can also be provided for the driver.

13 Event Recorder

A rugged or non-rugged event recorder can be integrated to you Trainnet® system in order to protect critical train-borne information.



Who we are

WHAT WE DO

EKE-Electronics provides technical solutions for train automation, system integration, diagnostics, on-board safety and communications within the train and beyond. Under our Trainnet® brand, we develop complete systems and applications for new trains and refurbishment projects alike.

MODULAR AND RELIABLE

Trainnet® was developed with flexibility in mind. It is an open platform enabling easy integration of sub-systems, including third party sub-systems. You can integrate HVAC, brakes, traction, batteries, lights, doors, sensors, and displays, to name a few.

OPENNESS AND IP RIGHTS

Trainnet® provides you with unparalleled freedom. You can own the intellectual property rights and

can also integrate third party system and applications if you wish: you have full control and are not tied up with a single provider or technology.

OBSOLESCENCE MANAGEMENT

We offer extended warranty as an option on all products and provide support for at least 30 years, managing obsolescence until the end of life of your rolling stocks.

FEW REFERENCES

We have over 30 years of experience conducting projects all around the world, including:

- London Underground (UK)
- São Paulo Metro (Brazil)
- SMRT Commuters (Singapore)
- Queensland Rail (Australia)
- VR Coaches (Finland)
- ÖBB locomotives (Austria)
- MTR Metro (Hong-Kong)
- Barcelona metro (Spain)



Before (right) and after (left) refurbishment conducted by EKE on the line 3 of the São Paulo metro, Brazil.

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