



APPROVAL OF SUBSYSTEMS

COMMUNICATION SOLUTIONS IN RAIL VEHICLES

Traditional. Innovative. SOLUTIONS.

funkwerk)))

FROM CONCEPT TO FINAL APPROVAL

Whether you are a railway operator or a vehicle/system manufacturer. We efficiently integrate operational communication systems into your vehicle – transparently, in accordance with standards, and with a clear focus on on-time commissioning.

AREAS OF FOCUS

- ▶ **Train radio** (voice communication) – integration, testing and certification
- ▶ **Data radio** – connectivity, routers/modems, interfaces and cybersecurity aspects
- ▶ **Retrofit** – migration of existing fleets/variants with minimal downtime

WHAT YOU CAN EXPECT FROM US

- ▶ Engineering, documentation, verification/validation and commissioning from a single source
- ▶ Experience from numerous European projects (roll-out, retrofit, multi-country approval, operator acceptance)
- ▶ Technically sound solutions, comprehensively documented and audit-proof



TRAIN RADIO

Proven reliability in operational voice communication.

We integrate **train radio systems** (e.g. MESA®26) into existing vehicle architectures, taking the installation location and power supply into account. This also includes the connection of control and audio devices. One of our strengths lies in planning for your migration to **FRMCS**, to enable a cost-effective and sustainable solution. We offer flexible migration solutions to protect your existing investment.

During integration, all manufacturer and operator interfaces are diagnosed and matched, and we provide installation and testing concepts, including installation and acceptance documentation.

Naturally, we provide support for type and unit testing, EMC assessments and documentation.

WIRELESS DATA TRANSMISSION

We ensure connectivity for your operations, diagnostics, passenger and back-office applications. When designing and planning the system, we take routers/modems, antennas, data and service interfaces as well as network coverage into account.

We integrate wireless data transmission into your vehicle networks via Ethernet, IP services and/or VPN, whilst conducting performance and stability tests. Where required, we manage your cybersecurity aspects (e.g. segmentation, hardening and update/release management).

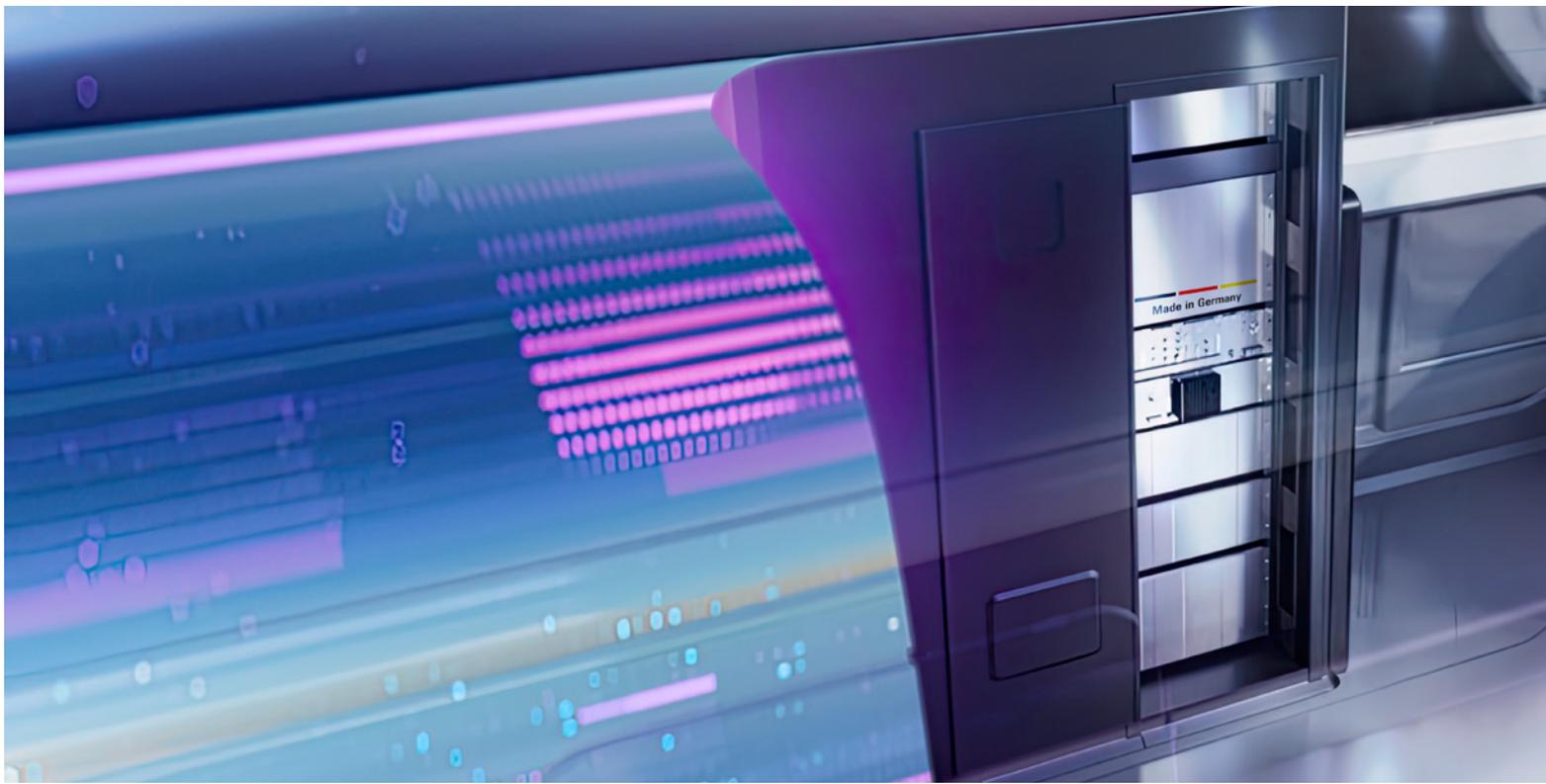
Our operational and maintenance concepts regarding remote access, logging and diagnostics ensure the operational reliability of your wireless data transmission.

RETROFIT

We ensure a predictable, sustainable and repeatable migration as well as fleet retrofit with minimal downtime:

- ▶ Retrofit/migration concept, including variant and change management
- ▶ Retrofit kits: parts lists, installation instructions, testing and acceptance procedures
- ▶ Support during workshop/on-site installation, commissioning and fault analysis
- ▶ Support during rollout from pilot to series production, including lessons learnt and process stabilisation





EXCELLENT CERTIFICATION MANAGEMENT

The railway market is a regulatory market. Without the necessary compliance of products with the applicable regulations, including relevant documentation and approvals, their use is not permitted.

Despite all efforts within the sector to harmonise and optimise requirements and procedures, the requirements remain high and the processes complex.

This is where Funkwerk's certification management makes the difference. Our expert team of specialists works in close collaboration with customers, assessment and approval bodies, as well as testing and inspection institutes on all aspects of certification.



OUR SERVICES

Funkwerk offers support for the subsystem testing of vehicles or vehicle series to meet the complex demands of the market, or carries out such testing on behalf of the customer. We also assist the change management departments of operators, owners or manufacturers in managing changes.

FURTHER SERVICES

We also offer services in relation to current topics such as vehicle authorisation, requirements capture, change assessment, conformity assessment and expert evaluation.

OUR APPROACH

- ▶ **Requirements & constraints:** Workshop/Initial assessment
- ▶ **Integration concept:** Architecture, interfaces, verification
- ▶ **Implementation & testing:** Integration, verification and validation activities, documentation
- ▶ **Acceptance & handover:** Operator support, support during series production and rollout

WHY FUNKWERK?

Subsystem integration is more than just installation: it involves the interaction of technology, verification, process reliability and stakeholder management. This is precisely where we bring our experience to bear – ensuring that your project not only ‘works’, but is also documented in a way that meets the requirements for acceptance and approval.

YOUR BENEFITS

- ▶ **Predictability:** clear milestones, transparent risks, robust schedule and effort estimates
- ▶ **Reliability:** traceable verification and validation records and a well-organised documentation system
- ▶ **Efficiency:** reusability through standards, templates and variant and configuration management
- ▶ **Practical relevance:** engineering expertise plus on-site implementation
- ▶ **Standards & regulations**
- ▶ **Support** in assessing compliance with relevant European and national regulations (e.g. TSI/EN)
- ▶ **Customer-specific specifications:** tailored to the vehicle, country of operation and operator processes

SERVICE OVERVIEW

- ▶ Requirements and interface specifications, as well as integration architecture
- ▶ Installation design, installation and testing concepts (workshop/on-site)
- ▶ Test plans, test reports, verification and validation documentation, acceptance documentation
- ▶ Configuration and change documentation (variants, releases)
- ▶ Operation/maintenance concepts, training and handover documentation
- ▶ Quick start
- ▶ Initial workshop (remote or on-site)
- ▶ Initial integration roadmap including risk/dependency analysis
- ▶ Proposal for pilot/prototype implementation and series rollout

GET IN TOUCH TODAY – WE MAKE INTEGRATION PLANNABLE!

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