



SIGNALLING SOLUTIONS

SAFETY and management of rail traffic

TRUSTED CONTROL AND SECURITY FOR SMART MANAGEMENT

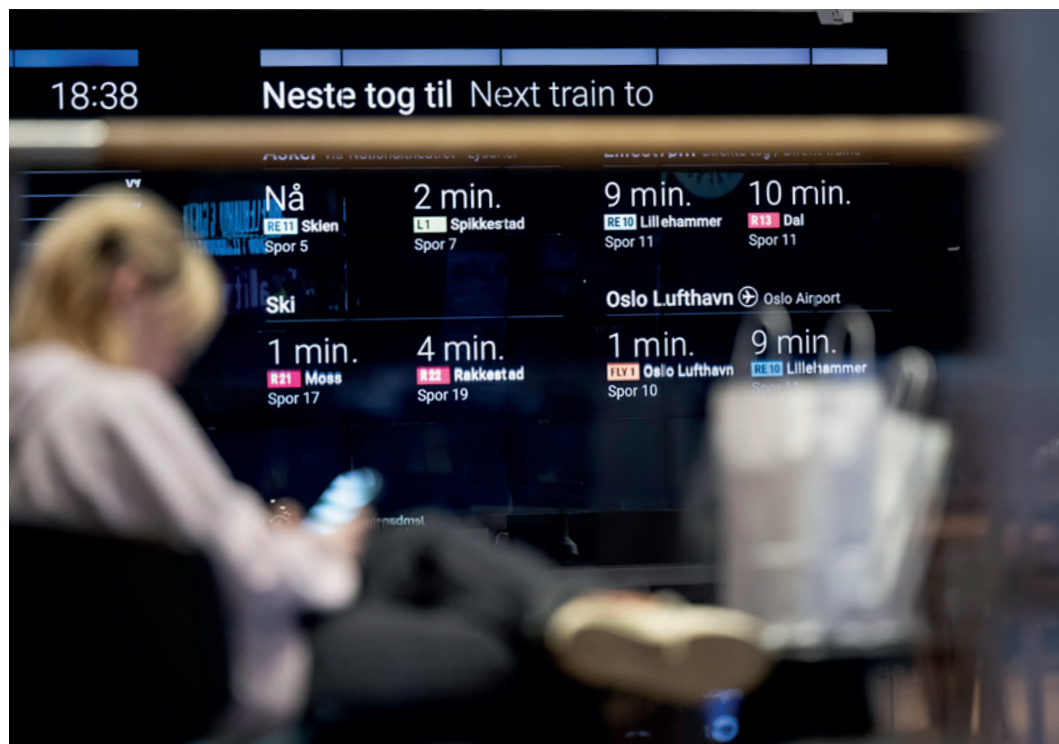


COMPREHENSIVE SOLUTIONS FOR RAIL CONTROL-COMMAND AND SIGNALLING

CAF is an international leader in the design and supply of integrated transport systems.

As a benchmark in sustainable mobility solutions, CAF's high value added-solutions focus on performance and passenger safety and comfort.

CAF offers project and engineering management at all stages, including system design, civil works, signalling, electrification and other electromechanical systems, supply of rolling stock and system operation and maintenance.



CAF designs, manufactures, supplies and maintains railway signalling systems, providing integral solutions both for trackside and on-board applications.

Utilising the company's proprietary cutting-edge technologies, CAF mobility solutions are tailored to meet specific customer requirements, minimising operating costs.

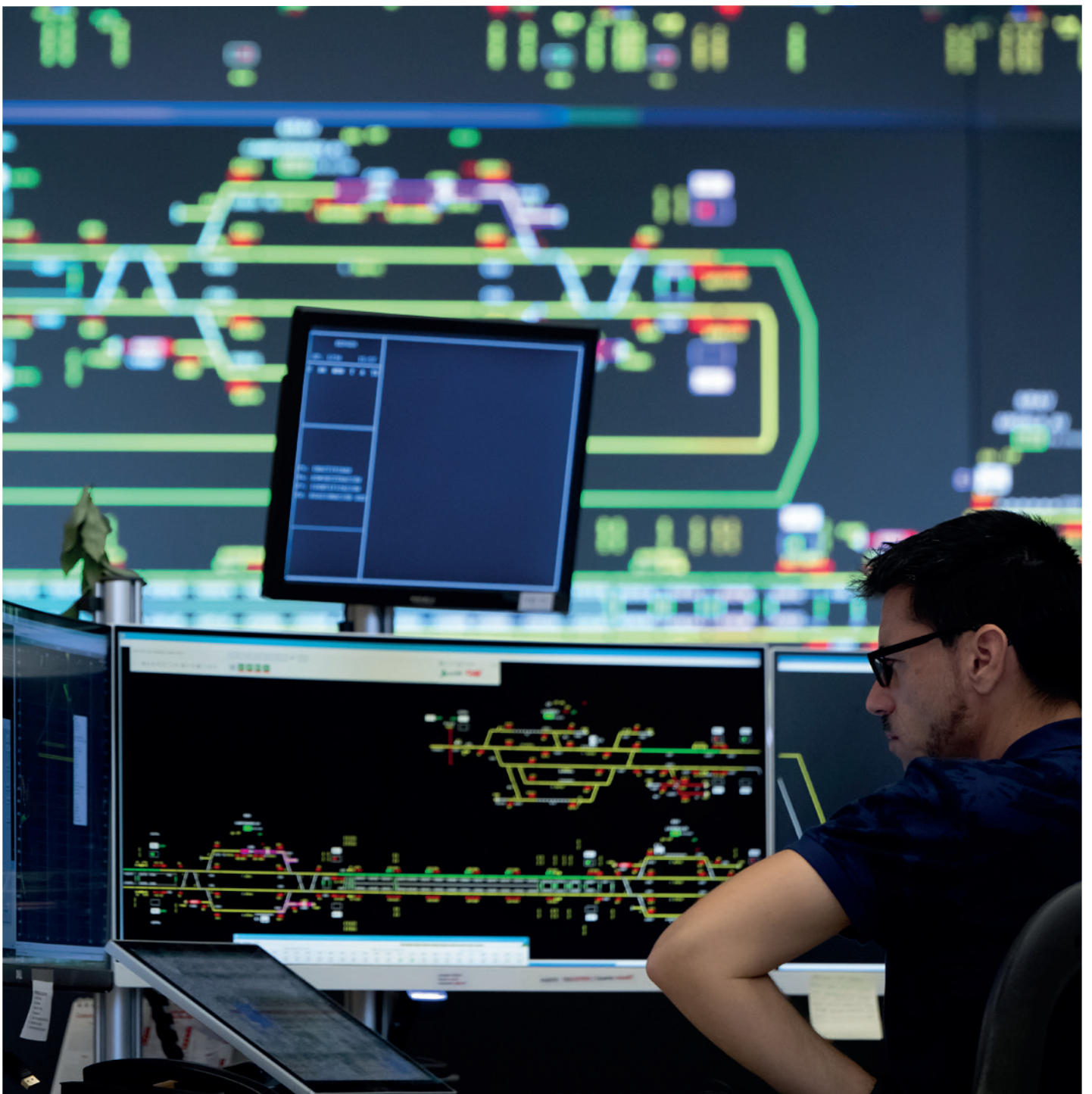
END-TO-END RAILWAY CONTROL

COMMAND AND SIGNALLING

We have a comprehensive solution portfolio for railway signalling and control allowing us to deliver all kind of projects successfully.

Our expertise covers mainline signalling, onboard equipment and urban operations. Our prime proprietary technology products form the core of our complete solutions.

With a clear customer focus, we develop signalling turnkey projects that include the design, manufacture, supply, maintenance and testing and commissioning of railway signalling systems.



CAF's advanced signalling solutions guarantee infrastructure managers and operators the highest safety standards.

QUASAR Q4
ELECTRONIC INTERLOCKING

AURIGA
ETCS LEVEL 1, LEVEL 2 AND ATO

NAOS
INTEGRATED CONTROL CENTRES

OPTIO
CBTC

QUASAR Q4
ELECTRONIC INTERLOCKING SYSTEMS

QUASAR Q4 is the basis of CAF's signalling solutions. A pioneer in the application of EN-50126 and other derived standards, the QUASAR Q4 electronic interlocking has evolved to support new functionalities and compatibility with ERTMS systems.

AURIGA
ETCS & ATO

Comprehensive solution for the European Rail Traffic Management System (ERTMS) and Automatic Train Operation (ATO) solutions, for both, infrastructure and on-board systems in vehicles.

AURIGA guarantees high performance ERTMS solutions for both Level 1 (AURIGA L1) and Level 2 (AURIGA L2), and also mixed systems in which both levels coexist simultaneously, ensuring technical and functional interoperability and providing important benefits in the operational and maintenance fields.

NAOS
INTEGRATED CONTROL CENTRES

NAOS has been specifically developed for the integrated and multifunctional control centres required by today's railway infrastructure control, command and signalling systems.

The NAOS integrated control centre not only provides an integration platform, but also encompasses several key systems. It includes centralised traffic control (CTC), the energy control system, SCADA systems to manage auxiliary equipment, control centres for detectors, and maintenance support systems. All of this combines to offer a comprehensive and efficient solution for railway management.

OPTIO
CBTC

OPTIO is CAF's Communications-Based Train Control (CBTC) system, integrating Automatic Train Protection (ATP), Automatic Train Operation (ATO) and Automatic Train Supervision (ATS), compliant with IEEE 1474 and IEC 62290. Designed for safety-critical operation, it delivers high availability and meets functional requirements, enabling flexibility, adaptability and scalability.

OPTIO supports all Grades of Automation (GoA1–GoA4) with a step-by-step migration path for new line deployment and the modernisation of existing infrastructure, and can interface with other systems to match each operator's strategy.



OPTIMAL RAILWAY MANAGEMENT

CAF is a specialist in railway signalling and control.

Our technology guarantees the highest standards of safety and efficiency in urban environments and main lines.

CAF applies all its knowledge and experience in the development of a range of products and services that includes complete solutions for all types of railway systems:

- MAINLINE SIGNALLING TRACKSIDE
- MAINLINE SIGNALLING AUTOMATION
- ERTMS & ATO ON-BOARD
- MASS TRANSIT
- TRAFFIC MANAGEMENT SYSTEMS
- TRAM SIGNALLING



MAINLINE SIGNALLING TRACKSIDE

CAF builds comprehensive solutions in the mainline trackside segment thanks to the use of the different product families in our portfolio:

- **QUASAR Q4:** SIL4 electronic interlockings for all railway applications.
- **AURIGA TS:** Automatic Train Protection (ATP) based on the ETCS standard, which can be integrated into complete ERTMS solutions.
- **NAOS:** Modular and flexible solution for multifunctional Control Centres.

MAINLINE SIGNALLING AUTOMATION

Automatic Train Operation (ATO) systems are transforming the railway ecosystem. This cutting-edge technology contributes to increase punctuality, energy efficiency, passenger comfort and improve traffic regulation.

- **AURIGA ATO:** It is the ATO system over ERTMS that enables automatic train driving up to GoA2 degrees of automation following the Technical Specifications for Interoperability (TSI) standards. The Auriga ATO system together with perceptual systems are being used for the development of systems with higher degrees of automation up to GoA4.

- **NAOS ATO:** This is the system that allows automatic planning and control of any line with ATO from track and which, by communicating with the trains enables the possibility of changing train gears, optimising energy consumption and ensuring punctuality. This system makes it possible to resolve conflicts due to incidents in real time.



ERTMS & ATO ON-BOARD

CAF's own compact and modular technology allows to respond to any particular need thanks to its flexible architecture, which adapts to all types of vehicles and platforms.

AURIGA OBS enables scalable strategies depending on the various operational needs and the availability of track infrastructure, going from ERTMS L1 to L2 and to ERTMS L2 with ATO.

It is an optimised solution that enables interoperability, fully compatible with ETCS track systems from other manufacturers. AURIGA OBS performs train movement supervision with high availability and safety.





MASS TRANSIT

Public transport is essential to transforming cities into more practical and sustainable environments. To meet ever-increasing passenger demand, transport systems must embrace digital innovation to improve service quality and increase train punctuality and frequency.

This also enhances operational flexibility, optimises energy efficiency and whole-life costs, and strengthens safety and reliability across the network.

TRAFFIC MANAGEMENT SYSTEMS

Our NAOS system has been implemented in numerous projects worldwide. Thanks to its experience in research and development (R&D), CAF develops ad-hoc solutions that adapt to the needs of any infrastructure manager or operator.

CAF covers products and services from integration into existing control centres to the delivery of turnkey solutions, ensuring flexibility and efficiency in each project.

TRAM SIGNALLING

CAF creates tramway solutions that have been proven successful in global projects.

We have extensive experience in adapting our knowledge to each customer's unique requirements with tailor-made solutions, integrating its own or third party products. These complete solutions in the tram segment are materialised with products such as:

- **QUASAR Q4:** Interlocking based on a modular hardware platform widely proven in light rail projects.
- **BUS NAOS:** Proprietary ESB bus system, where all the different systems needed to operate and maintain a tramway system are integrated at the control centre level.
- **CTC, SCADA:** Integrated control centre applications for tramway control and operation.
- **Automatic Train protection (ATP):** Train protection system applications.
- **AVLS, RSS, TPS:** Over time we have achieved a long history of successful integration of auxiliary systems such as the Automatic Vehicle Location System (AVLS), the Route Request System (RSS) or the Traffic Priority System (TPS).



OUTSTANDING PROJECTS WORLDWIDE

AFRICA

EGYPT - Signalling and telecommunication system for Egyptian National Railways (ENR)

MOROCCO - Railway signalling for Casa-Port railway terminal and railway energy control system for Office National des Chemins de Fer (ONCF).

AMERICA

ARGENTINA - Control centre for Administración de Infraestructuras Ferroviarias Argentinas, Sociedad del Estado (ADIF SE)

CHILE - Control centre for Empresa de los Ferrocarriles del Estado (EFE) - Remote energy management for Metro Regional de Valparaíso.

MEXICO - Integrated control centre, ATO and on-board ERTMS L2 for Secretaría de Infraestructura, Comunicaciones y Transportes (SICT) – Signalling and telecommunication systems including ETCS L1 and CTC for Ferrocarriles Suburbanos – Signalling and telecommunication systems including ETCS L1 and CTC for SCT and SEDENA

URUGUAY - Signalling systems, OCC and telecommunications and on-board L1 ERTMS for Consorcio Constructor Ferrocarril Central (CCFC) – On-board L1 ERTMS for Grupo RA

ASIA / PACIFIC

AUSTRALIA - On-board L2 ETCS & ATO for Transport for New South Wales (TfNSW)

INDIA - SCADA system for Delhi Metro Rail Corporation

NEW ZEALAND - Retrofit of on-board L1 ERTMS for Kiwi Rail - ETCS & ATO on-board systems for Auckland Transport

TAIWAN - Signalling systems and control centre for Kaohsiung light rail system for Mass Rapid Transit Bureau, Kaohsiung City (KMRT)

EUROPE

BELGIUM - Signalling system and control centre for Opérateur de Transport de Wallonie (OTW)

BULGARIA - Signalling systems including ETCS L1 for National Railway Infrastructure Company (NRIC) - On-board L2 ERTMS for BDZ

CROATIA - On-board L2 ERTMS for HŽ Infrastruktura

CZECH REPUBLIC - Retrofit of on-board L1/L2 ERTMS integrated with LS/LS06 for Arriva Vlaky – On-board L1/L2 ERTMS integrated with LS/LS06 for Arriva Czech Republic – Retrofit of on-board L1/L2 ERTMS integrated with LS/LS06 for České Dráhy, including different DMU fleets – Retrofit of on-board L1/L2 ERTMS integrated with LS/LS06 for TESMEC Yellow Machines – On-board L1/L2 ERTMS integrated with LS/LS06 for RegioJet, including ELF 655 EMUs and EMUs – On-board and retrofit on-board L1/L2 ERTMS integrated with LS/LS06 for Správa Železniční dopravní cesty (SZDC) – On-board L1/L2 ERTMS integrated with LS/LS06 for CZ Loko – Retrofit of on-board L1/L2 ERTMS integrated with LS/LS06 for AŽD Praha s.r.o., including DMUs 818 and class 810 locomotive

FINLAND - OPTIO CBTC system for Metro Helsinki including wayside, on-board and ATS systems

GERMANY - Retrofit of on-board L2 ERTMS integrated with PZB for DB InfraGo – Retrofit L2 ERTMS and PZB for DB Regio

HUNGARY - Retrofit of on-board L1/L2 ERTMS integrated with LS/LS06/EVM for PKP

ITALY - OPTIO CBTC GoA4 for Ente Autonomo Volturno S.r.l. (E.A.V. S.r.l.)

NETHERLANDS - On-board ETCS equipment and on-board L2 ERTMS integrated with ATB, and On-board L2 ERTMS, ATB and ATO for Nederlandse Spoorwegen (NS) - ATB for Qbuzz

POLAND - On-board L2 ERTMS integrated with SHP for KD, including EMUs and RegioFoxy 231 DMUs – On-board L2 ERTMS integrated with SHP for PKP Intercity, including EMUs 227M/228M and locomotives – On-board L2 ERTMS integrated with SHP for LKA – On-board L2 ERTMS integrated with SHP for Pomorskie – On-board L2 ERTMS integrated with SHP for PKP, including 65WEh and 68WE ELF EMUs – On-board L2 ERTMS integrated with SHP for RegioJet – On-board L2 ERTMS integrated with SHP for KM – On-board L2 ERTMS integrated with SHP for Kuj-Pom – Retrofit of on-board L2 ERTMS integrated with SHP for BR232/SM42 Yellow Machines

ROMANIA - On-board L2 ERTMS integrated with PZB for the Railway Reform Authority

SLOVAKIA - Retrofit of on-board L2 ERTMS integrated with LS06 and retrofit of on-board L1/L2 ERTMS integrated with LS/LS06/EVM for ZSSK – Retrofit of on-board L1/L2 ERTMS integrated with LS/LS06/EVM for České Dráhy – Retrofit of on-board L1/L2 ERTMS integrated with LS/LS06/EVM for Leo Express – On-board L1/L2 ERTMS integrated with LS/LS06/EVM for CZ Loko – Retrofit of on-board L1/L2 ERTMS integrated with LS/LS06/EVM for Slovak Railways

SLOVENIA - Modernisation of signalling systems for Slovenian Railways

SPAIN - Railway energy control system, Traffic Management System (TMS), ERTMS L1 signalling systems of the Atlantic axis railway, signalling and communications systems including ERTMS L1 and L2 and on-board L1/L2 ERTMS and ASFA for Administrador de Infraestructuras Ferroviarias (ADIF) – Signalling systems for L3 Metro Bilbao for Euskal Trenbide Sarea / Red Ferroviaria Vasca (ETS) – On-board and retrofit on-board L1 ERTMS for Eusko Trenbideak - Ferrocarriles Vascos, S.A. (Euskotren) – On-board L1/L2 ERTMS and ASFA for Renfe – Retrofit of on-board L1 ERTMS and ATO for Serveis Ferroviaris de Mallorca (SFM)

SWEDEN - On-board L2 ERTMS integrated with ATC 2 for SJ AB

TÜRKIYE - Signalling and communication system for Antalya Metropolitan Municipality – ERTMS L1 signalling, control center and communication systems for Turkish Railways (TCDD)

UNITED KINGDOM - ETCS L2 Signalling system for digital signalling within the Train Control System Frameworks (TCSF) for Network Rail - On-board L2 ERTMS integrated with TPWS for Wales & Borders and TPWS London North Eastern Railway (LNER)

MIDDLE EAST

ISRAEL - Signalling of Tel Aviv purple line for NTA Metropolitan Mass Transit System

SAUDI ARABIA - Retrofit of on-board L2 ERTMS for SAR

UNITED ARAB EMIRATES - On-board L2 ERTMS for Etihad Rail



**CAF SIGNALLING
HEADQUARTERS**

Juan Fermín Gilisagasti 4, 2nd floor
20018 San Sebastián
Spain

SCAN TO VISIT
OUR CHANNEL

