End-to-End Solutions Based on Intel® Technologies Help Simplify Operators' Journeys to Smarter Railways

Smarter. Safer. Sustainable. And faster than ever before. This is what the future of railways looks like and what train operators and governments must enable to ensure rider satisfaction.

Help Operators and Governments Improve Key Priorities

Increased Efficiency
Using deep learning and AI through computer vision, you can help operators monitor passenger flow and gather data for advanced analytics to enable more-informed decision-making around operational inefficiencies, congestion, staffing and security.

Enhanced Safety
Computer vision and AI-enabled smart cameras help automate safety alerts and enable wayside monitoring, brake and wheel inspection, and collision avoidance and prevention technologies.

Reduced Downtime
Sensors, cameras, and in-vehicle computers empower rail operators to monitor their fleet's diagnostic data, which can help minimise breakdowns, predict maintenance repairs and optimise servicing schedules – keeping trains moving and in working order.

Increased Passenger Satisfaction
With advanced technology, operators can personalise travel for individual passengers with near-real-time data collection and analysis or provide strong and reliable onboard wifi so passengers can stay connected throughout their journey.

How We Help You Build the Best Solutions for Railway Operators

Intel experts can provide advice and support as you guide railway operators on their journey to a smart railway. We help simplify the path to intelligent operations with our end-to-end portfolio of technologies, years of expertise, and engineering resources. Complementing our technologies, products and architectures is a broad set of global ecosystem partners whom we work with to help accelerate development and create solutions with maximum performance, interoperability and value. Together with our partners, we bring the latest consolidation technologies, such as containerisation and hyperconverged infrastructure, to the edge to enhance scalability and maximise the value of each asset on the networks of railway companies and entities. When located at the edge, our industry-standard processors can help enhance a railway's data security and privacy by limiting the transmission of data over the internet and reducing the risk of interception. You can also leverage Intel® processors to integrate devices, software and our partner solutions to give operators a holistic view of their entire railway network.

Safety and Security
Train Collision Avoidance Systems (TCASs)

Intel-based TCAS solutions work by capturing, analysing, and performing sensor fusion on the data sourced from sensors and visual imaging cameras to better

understand the train's current operating environment. When this information is also used alongside the Intel® Distribution of OpenVINO™ toolkit and advanced software algorithms at the network edge, the train control centre receives an intelligent, 360-degree view of the surrounding scene. This enables the system to detect and classify obstacles like oncoming trains, maintenance workers or animals and trigger safety-based corrective actions, such as warning alerts and braking for drivers and alerts for trackside maintenance workers.

Predictive Maintenance

Smart Pantograph-Catenary Monitoring Systems (PCMSs)

By helping operators transition their railcars to a fully automated smart pantograph-catenary monitoring system – based on Intel technologies and Intel partner solutions – you can help them use predictive maintenance to create a foundation for continuous improvement, increase operational readiness and maximise fleet return on investment. The system retrieves captured images and uses advanced Intel-based visual imaging technologies and artificial intelligence to analyse each image before generating a report, which is immediately shared with the operator via near-real-time notifications. PCMSs can play an important role in helping operators lower maintenance costs; extend life cycles of tracks, trains, and equipment; and provide passengers with improved reliability of railway operations alongside a better overall experience

Passenger Experience

Automated Fare Collection (AFC) Systems

An AFC system consists of a variety of edge components which allow passengers to enjoy contactless transaction options, smart ticketing and less-congested gateways. In addition to providing a new, enhanced passenger experience, Intel-based AFC systems help railway operators increase operational efficiency. These systems offer centralised management of electronic ticket distribution, eliminating the need for cash management, protecting revenue and simplifying back-end billing. AFC systems powered by Intel® edge-ready computing, connectivity and storage technologies can perform ultrafast data processing on the data collected from the sensors, machines and other components and devices located at the railway station edge. This allows for near-real-time operations of kiosk and ticket vending controllers and enables the use of up-to-date data on customer behaviour, train usage and transit service performance for better decision-making and long-term planning.

Deliver Innovative Railway Technologies, Solutions and Strategies to Operators

As railway operators get back on track after years of uncertainty, they face new challenges, heightened expectations and shrinking budgets that you can help them address. With advanced, intelligent railway technology from Intel and our global partner ecosystem, you can guide railway companies' transformation to smart railways that help improve passenger experiences, safety and operational efficiency.

Learn More

Get more information about smart railways, discover use cases and accelerate railway modernisation.

Visit **intel.com/railways**

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