Transportation & Railway

Integrated Onboard Surveillance for Railway Applications

AXIOMTEK®

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Rail-Certified NVR for Onboard Surveillance

Passenger rail operators rely on onboard surveillance to support safety, service quality, and operational visibility. In each carriage, cameras, network devices, and wireless access points must stay stable despite vibration, shock, temperature changes, and limited space. When systems depend on separate routers, switches, and power infrastructure, deployment becomes harder to scale and maintain.

RegioJet a.s., a leading private rail and bus operator in Central Europe, needed a reliable, integrated platform for rail environments. AKERMANN ELECTRONIC PRAHA, spol. s r.o., technology provider, selected Axiomtek's tBOX520 railway Box PC as the core platform for RegioJet's rail-certified NVR solution. The solution helped simplify installation, reduce complexity, and improve monitoring reliability.

Certified to EN 50155 and EN 45545-2, the tBOX520 integrates railway-grade computing with PoE and Ethernet connectivity through modular PoE expansion modules, helping simplify carriage architecture and support future surveillance expansion.

Challenges

RegioJet's previous surveillance system was hindered by a complex architecture that required separate switches and routers in each carriage due to limited PoE connectivity. This increased installation cost, cabling complexity, and potential points of failure across the train environment. At the same time, constant shock, vibration, and extreme temperature conditions placed additional pressure on system stability.

The customer needed a more integrated, railway-grade NVR platform that could centralize computing, network connectivity, and PoE support while maintaining long-term reliability and future scalability. The system also had to meet strict railway deployment requirements and support flexible I/O configurations for different onboard devices.

Key Requirements:

- EN 50155 and EN 45545-2 certified platform for railway onboard deployment
- Rugged fanless design for reliable operation under shock, vibration, and wide temperature conditions
- 24 to 110 VDC power input for flexible railway power integration
- Integrated NVR computing and PoE switching to simplify system architecture
- M12 Ethernet connectivity for secure and stable onboard network connections
- Modular I/O architecture supporting Ethernet, PoE, COM, DIO, CAN, and BNC expansion
- Serviceable storage design for video recording and easier maintenance
- Scalable architecture to support future surveillance and onboard connectivity upgrades

Solution

Rail-Certified NVR for Onboard Surveillance

To meet RegioJet's requirements, AKERMANN ELECTRONIC selected Axiomtek's EN 50155- and EN 45545-2-certified tBOX520 railway Box PC with VAM706 and VAM707 modules. The platform provides four M12 X-coded GbE ports via VAM706 and four M12 X-coded PoE GbE ports via VAM707, allowing multiple onboard devices to connect and receive power through one compact, fanless railway computer.

By combining NVR computing and PoE switching in a single system, the tBOX520 reduces the need for separate switches and additional power infrastructure inside each carriage. This simplifies system design, lowers wiring complexity, and improves deployment efficiency.

Designed for railway environments, the tBOX520 supports 24 to 110 VDC power input, -40°C to +70°C operation, intelligent power management, and two swappable 2.5-inch SATA drives. Its value-added module architecture also provides flexibility for LAN, COM, DIO, PoE, CAN, and BNC expansion needs.

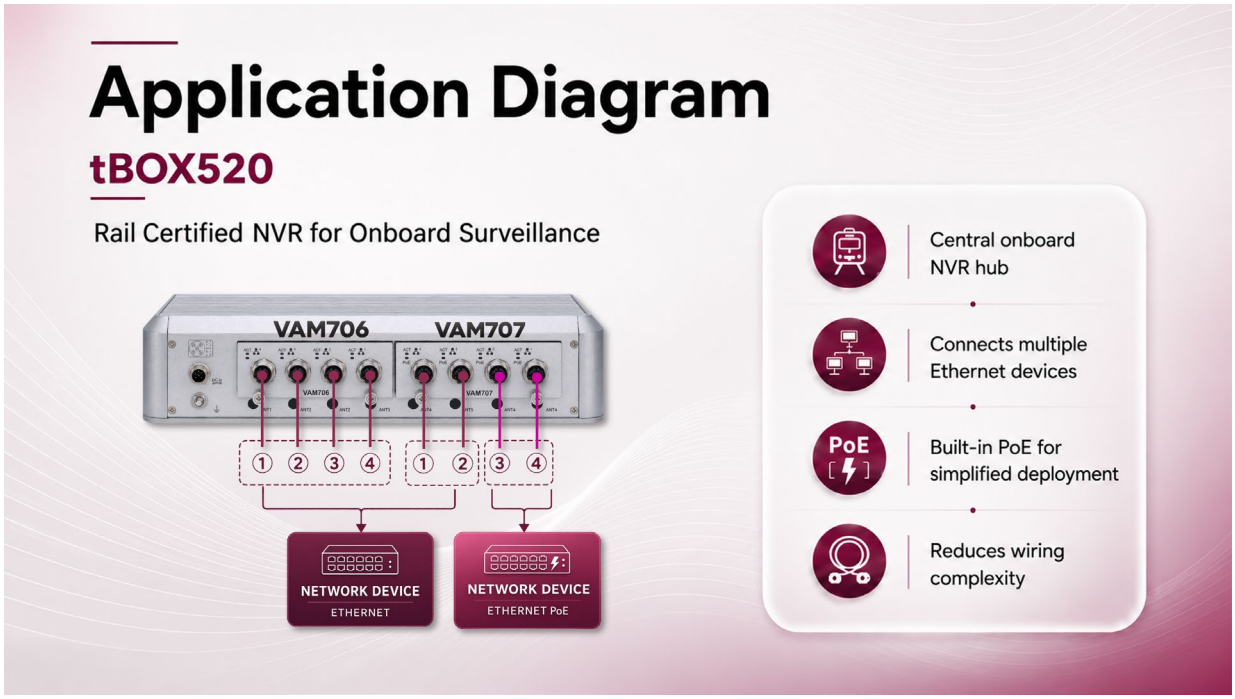
Application

Integrated Surveillance Across Train Carriages

Axiomtek's tBOX520 serves as the central onboard hub for RegioJet's surveillance system. It connects Ethernet devices via the VAM706 and supports PoE devices, such as IP cameras and Wi-Fi access points, via the VAM707. This allows network connectivity and power delivery to be handled through a single platform, reducing the amount of auxiliary hardware required inside each carriage.

In operation, the platform consolidates NVR computing, Ethernet connectivity, and PoE support for onboard surveillance. The integrated design helps streamline installation, improve maintainability, and reduce potential failure points by lowering the number of separate components that must be installed, powered, and serviced across the train environment.

The result is a more practical and scalable surveillance architecture for railway operators seeking stable video recording, simplified deployment, and reliable connectivity in demanding onboard conditions.



System Configuration

tBOX520 with VAM706 + VAM707:

- CE, LVD, FCC, EN 50155, and EN 45545-2 certified
- 12th Gen Intel® Core™ i7/i5/i3 or Intel® Celeron® processor
- -40°C to +70°C wide operating temperature range
- 24 to 110 VDC power input for railway applications
- Eight M12 X-coded GbE ports: 4 GbE via VAM706 and 4 PoE GbE via VAM707
- Value-added modules available for COM, LAN, DIO, PoE, CAN, and BNC requirements
- Intelligent power management with smart ignition
- Two swappable 2.5-inch SATA drives

Why Axiomtek

Axiomtek helps transportation solution providers simplify system integration by combining rugged computing, railway certification, modular I/O, and deployment-focused design on a single platform. For RegioJet's onboard surveillance upgrade, tBOX520 provided the certified railway foundation, PoE connectivity, and expansion flexibility needed to reduce hardware complexity while supporting stable operation in train environments.

The platform's integrated architecture enables solution providers to reduce reliance on auxiliary components, simplify carriage-level wiring, and create a more maintainable NVR deployment. With EN 50155 and EN 45545-2 certifications, wide power input range, wide operating temperature support, M12 connectivity, and modular expansion options, the tBOX520 provides railway integrators with a practical foundation for reliable onboard surveillance systems.

Customer Testimonial

In our pursuit of service excellence, reliability and integration efficiency are essential. Axiomtek's railway-certified Box PC, with EN 50155 compliant design and integrated PoE switching, helped improve the stability and deployment efficiency of our train surveillance system. It represents both a hardware upgrade and a valuable partnership built on innovation.

Miroslav Pudil
Product Manager
AKERMANN ELECTRONIC PRAHA, spol. s r.o.

About

Axiomtek Co., Ltd.

Axiomtek designs and manufactures industrial embedded computing platforms that serve as the control and data foundation for edge systems deployed in real operations. Its portfolio spans embedded boards, industrial motherboards, fanless embedded systems, industrial PCs, and rugged platforms, built to support long-term availability, predictable integration, and stable performance under continuous duty.

Across automation, machine vision, logistics, transportation, energy, smart retail, healthcare, and edge AI, Axiomtek works with equipment makers and solution providers to bring compute closer to the point of work. With flexible I/O and expansion, scalable processing options, and product roadmaps aligned to lifecycle planning, Axiomtek helps teams deploy systems faster, keep fleets maintainable, and sustain consistent operation across distributed sites.