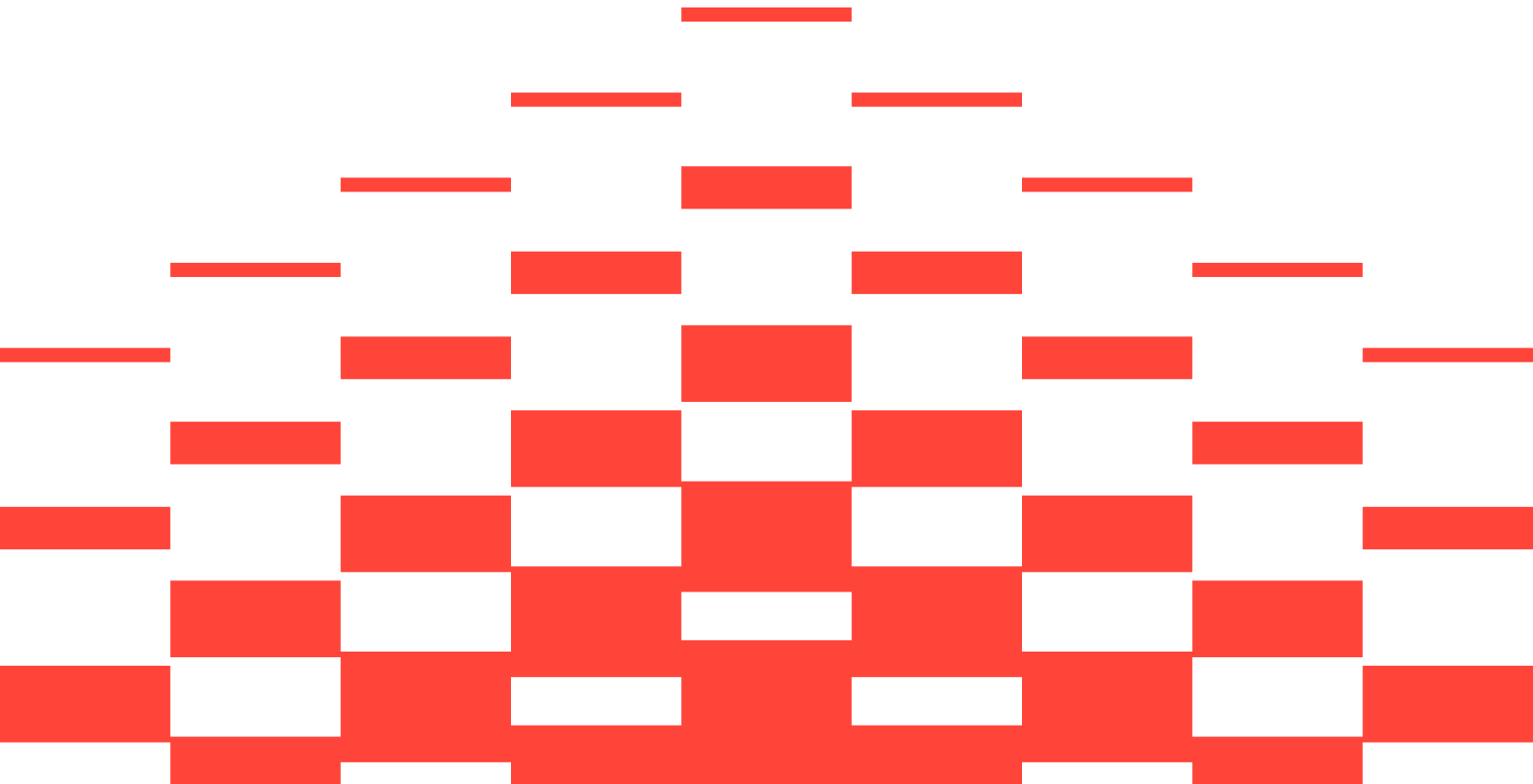
QNX | Universal Signalling

Case Study

Accelerating Railway Signalling with QNX

Universal Signalling Is Transforming Signalling Deployment in the Rail Industry With A Software-Defined Approach Powered by QNX



Customer Background

Founded in 2022, UK-based Universal Signalling makes digital train control faster, cheaper and more accessible. Its team of signalling and safety-critical software experts focuses on software-defined signalling and in-cab supervision that removes bespoke design work, enabling operators to see benefits in weeks.

Early projects include test-track deployments at the Global Centre of Rail Excellence in Wales and BCIMO in Dudley, recently followed by a first commercial deployment on the Coventry Very Light Rail system. The company targets infrastructure owners, vertically integrated metros, and export markets like North American freight—where cost, time and capacity pressures are high.

Highlights

- **Fast, Low-Cost Rollout:** Architecture designed to install signalling in days and deliver benefits in weeks—targeting a small fraction of traditional programme cost.
- **Safety Built-in:** Engineered to meet SIL4 and EN 50126, using QNX RTOS and hypervisor to speed assurance versus bare-metal builds.
- **Deterministic Real-Time:** QNX runs the 1–10 ms safety loops that drive trackside I/O and in-cab displays, giving drivers precise, timely information.
- **Small Team, Big Output:** Leveraging COTS (commercial off-the-shelf) hardware and QNX's proven foundational software to innovate faster without reinventing the basics.

The Challenge

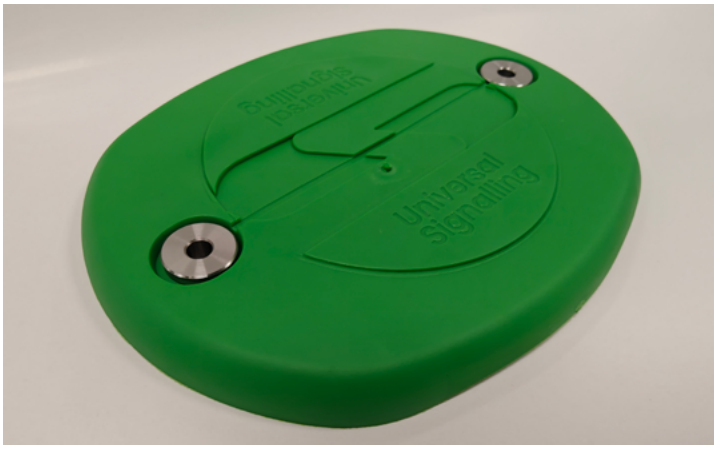
How do you compress a decade-long signalling programme into days—without compromising SIL4?

Current signalling projects are slow, costly and resource intensive. A 100 km UK ETCS rollout is expected to take ~12 years and cost ~£2 billion, with most expense in people and engineering. Long timelines delay benefits, while a shrinking pool of signalling engineers' limits capacity.

Any new system must still meet rail's strict safety standards (EN 50126/SIL4), often requiring large volumes of assurance work. Technically, trainborne systems must respond deterministically in real time so drivers get the right context at the right moment.

Supporting safety-critical signalling systems requires robust foundational software that can respond and be available across multiple scenarios.

Universal Signalling set itself a clear goal: re-architect signalling to enable automation of the design work and fitment, allowing commissioning and benefit delivery to happen in days or weeks—with assurance focused only on novel elements, not the commodity foundation.



The Solution

Signalling, re-engineered for speed and safety with accelerated deployment

Universal Signalling's design centres on compact, train-mounted computers, minimal wayside equipment, and an extensible software-defined interlocking, with QNX as the safety-ready, real-time OS.

Train fitment is via a permanent or removable module, housing all required equipment, including NXP's i.MX8-class compute, LTE modem and IMU. It localizes the train, measures its velocity vector and sends data to the cloud interlocking. An in-cab display shows drivers speed and movement limits. Most intelligence resides in software, not costly bespoke infrastructure.

QNX runs safety-critical loops, communications and the HMI in isolated partitions, delivering deterministic performance and simplifying the safety case. Standing on a pre-certified OS and proven stacks cuts re-verification effort and lets the lean team focus on innovation.

The approach uses COTS hardware, existing connectivity, and automated design tools to keep deployment fast and repeatable. Accessible tooling and simulation allow a small team to develop, test and certify efficiently, making the "install in a day" ambition realistic.

The Result

From years to a day, targeting a fraction of the cost

Early demonstrations show the potential to turn multi-year, bespoke programmes into rapid, low-cost rollouts, without weakening the safety case.

Key outcomes (projected/emerging):

- **Accelerated Deployment:** Fitment and commissioning designed for single-day deployment.
- **Fraction of Traditional Cost:** Over 80% savings compared to conventional ETCS upgrades.
- **Continued Upgrades Implemented in Weeks:** Capabilities can be activated incrementally during rollouts.
- **Save time with Smaller Assurance Scope:** Pre-certified QNX foundation accelerates EN 50126/ SIL4 compliance.
- **Optimize Resources with Lean, Fast Iteration:** Tooling and ecosystem enable quick simulation and on-track testing with minimal bottlenecks.

> **ROI is still emerging — we're pre-commercial — but the real return is that this stack (including QNX) makes the business possible. Without it we wouldn't have a product to sell.**

Dr. Sam Bemment, CEO.

Why QNX?

- **Deterministic Real-time:** Predictable 1–10 ms control loops essential for localization, braking supervision and driver display.
- **Safety Pedigree:** Pre-certified RTOS and stacks reduce paperwork, cost and certification time.
- **Partitioning and Resilience:** Isolated environments for safety-critical loops, comms and HMI simplify design and assurance.
- **Lean-Team Friendly:** Mature tooling, device support and networking enable fast iteration without rebuilding fundamentals.
- **Proven in Mission-Critical Systems:** Long-term support and clear certification artefacts build operator and regulator trust.

About Universal Signalling

Universal Signalling was founded in the United Kingdom in 2022 to commercialize intellectual property under development by the founders since 2018. The goal is to bring revolution to the stagnant worldwide railway signalling market through a unique blend of technology, operating model, and open interface specification. Rail is the greenest and most accessible mode of transport. Universal Signalling's rapidly growing team of industry experts is passionate about improving it to bring rail's countless benefits to more members of society, faster.

Learn more at universalsignalling.com →

What's Next

The next 12–18 months' focus for Universal Signalling is on level-crossing programmes and pilots to prove fitment speed, reliability, and safety at scale. In parallel, the team will advance certification planning, leveraging QNX to keep the assurance scope concise, future-proof the design and make it regulator-ready.

Technical priorities include refining the vehicle module, scaling wayside fitment, and strengthening simulation tools for repeatable certification and acceptance tests. Commercially, the aim is to convert pilots into rollouts with early-adopter operators, then expand to export markets.

Regular demo days at test tracks will give operators, integrators, and regulators a first-hand look at installation speed, HMI behavior, and safety workflows.

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About QNX

QNX, a division of BlackBerry Limited, enhances the human experience and amplifies technology-driven industries, providing a trusted foundation for software-defined businesses to thrive. The business leads the way in delivering safe and secure operating systems, hypervisors, middleware, solutions, and development tools, along with support and services delivered by trusted embedded software experts. QNX® technology has been deployed in the world's most critical embedded systems, including more than 255 million vehicles on the road today. QNX® software is trusted across industries including automotive, medical devices, industrial controls, robotics, commercial vehicles, rail, and aerospace and defense. Founded in 1980, QNX is headquartered in Ottawa, Canada.

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