



zenitel

because communication is critical

CASE STUDY

Rail Infrastructure



Market Segment:
Rail Infrastructure

Country of installation:
Norway

Year of Installation:
2010 - ongoing

End Customer:
Bane NOR

System Integrator:
Bane NOR

Solution:
**Public Address, Voice Alarm,
Control System**

Key Products:
**VENCS,
VIPEDIA-12-NET,
VAIA,
IPAM400
IP400**

Key Technology:
**Powerful API integration,
remote control and
monitoring, Exceptional audio
quality, EN 54 compliance,
VoIP**

Bane NOR - Norway's national railway

Zenitel have delivered reliable PAVA systems for Norway's primary state-owned railway company, Bane NOR, for 12 years and counting, dealing with a variety of remote sites and extreme weather scenarios.

The End Customer

Bane NOR is a state-owned company responsible for the Norway's national railway infrastructure. Their core mission is to ensure accessible railway for the entire country by providing improved infrastructure and efficient and user-friendly services.

Bane NOR have been a key Zenitel client for 12 years and counting - the longstanding relationship a testament to Zenitel's ability to deliver large scale, turnkey solutions while working directly with the end user.

The Requirement

Zenitel were required to provide hardware, software and services associated with the delivery of audible customer information to help Bane NOR accomplish their mission. This included the provision of amplifiers, controllers, loudspeakers, microphones, ambient noise control and remote monitoring, providing over 360 stations with state-of-the-art PA systems to ensure the delivery of information to the public. In addition, Zenitel supplied a further four major stations (Holmestrand, Oslo Central, Nationaltheatret and Gardemoen) with comprehensive PAVA systems, fully compliant with EN 54, to ensure the public remain protected as well as informed.

Some Bane NOR stations pose considerable security, installation, and practical challenges including operation in harsh environments and

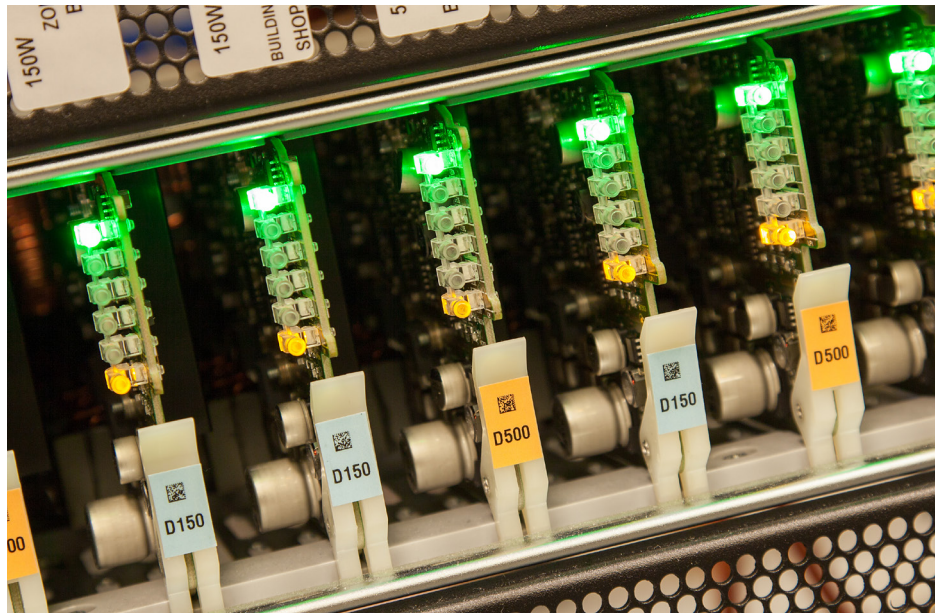
the accessing of remote destinations. This, combined with rapidly evolving passenger demands results in the need for new and creative solutions, tailored to individual use cases.

As market leaders in the rail sector, Zenitel's experienced team of engineers both on-site and office-based are well positioned to provide an extensive range of delivery services such as: acoustic design, Site CAD, system design, system build, system testing, site commissioning as well as ongoing maintenance support. On the entertainment front, there was a need for high-quality BGM, streamed from a central source via a Dante network. Additionally, Zenitel provided loudspeakers which played out the audio associated with various digital signage screens across the site.

The Solution

Over the years, Zenitel have supplied Bane NOR with a number PAVA solutions, all cutting edge for their time. Although the technology has progressed, legacy systems are serviced routinely and are still in operation today.

The first-generation amplifier, the IPA400 designed specifically for Bane NOR application, broke ground, combining PA amplification, routing, and Ethernet connectivity in a single 2U unit and is installed in stations across Norway. Zenitel's Voice-over-IP software (VIPA) allow for easy



distribution of audio over a network, whilst proving seamless integration with third-party train scheduling engines to provide real-time arrival and departure predictito everyone for years to come.

Building on the IPA, the IPAM400 was introduced, offering the same core functionality but with the addition of monitoring. Provide remote reassurance to the maintenance team that the systems are working as expected.

The introduction of the VIPEDIA PAVA range, developed specifically for larger, safety critical sites, offered an EN 54 certified alternative to the IPA/iPAM and is installed at key Bane

NOR sites. Containing increased digital signal processing (DSP), the VIPEDIA-12 controller has the capacity to store up to sixty-four internal Digital Voice Announcement messages, and hosts Zenitel's VIPA long-line public address software, which also run on the hardware.

Following the tailor approach, Zenitel's next generation VAIA amplifiers / controllers' solution has once again been designed in consultation with Bane NOR, to ensure it continues to meet their ever-evolving requirements. It integrates seamlessly with existing ecosystems, whilst also being more cost effective and environmentally friendly. This new hardware offers improved audio performance, greater power density and eased operation. Other functional benefits include 48V DC operation, allowing units to be powered directly from the local supply without the need for expensive inverters, and enhanced preventative maintenance features to ensure lower whole life costs. In addition, key to Bane NOR was VAIA's future-proof and scalable design which provides a platform for the next 10 years.

The VAIA was the perfect solution for the Follo Tunnels project, which is in the latter stages of construction. The train tunnel will run almost 20km, connecting Oslo and Ski in a bid to boost economic development and links between the



two areas. Over such a distance, the improved connectivity, scalability and cost efficiency of VAIA makes it the perfect fit.

All equipment is elegantly connected to Zenitel's iVENCs, an open and intuitive integrated management platform, which offers comprehensive control, remote condition monitoring, and incident analysis across the PAVA subsystem.

The Challenges

Challenging Acoustic Environments:

Tunnels such as Follo and Holmestrand present extremely poor acoustic environments, as the curvature of the walls and hard surfaces reflect sound, interfering with the intelligibility of announcements. To solve this, Zenitel's acoustic design is reinforced with Zenitel's powerful DSP, providing parametric EQ control to suppress particularly reverberant frequencies, ambient noise control to limit acoustic energy and delays to time align speakers.

Low Operational Temperatures:

With many stations being located north of the Arctic Circle, temperatures can drop to as low as -40°C. To counter this, Zenitel products are built to withstand extreme temperatures: the

loudspeakers utilised in these locations are fully IP65 compliant without compromising the performance.

The ANS sensors were also designed for environments which are subject to heavy snowfall, with options for snow hoods and specialist adjustable mounting brackets.

Remote Locations:

Due to the country-wide scale of the company's projects, many stations are remote, and unmanned, so remote announcements are critical to ensure passengers stay informed. Zenitel's VIPA API interface allows Bane NOR to stream automated announcement from a remote Control Centre. In addition, Zenitel's iVENCs Monitoring system provides reassurance via 24/7 status reports across all Zenitel assets, flagging faults on the timeline. The remote interface allows maintenance engineers to carry out remote support and maintenance activities.

System Reliability:

In this application, system reliability is paramount. It is crucial that all aspects of the system function as they should, as any down time would result in Bane NOR not meeting their high standards. Therefore, all Zenitel hardware is produced with durability at its core – designed to the highest

standards of reliability, audio quality and performance. This is why Zenitel equipment is still in operation, even 10 years of continuous use.

Interoperability:

Zenitel are required to introduce next generation hardware with added benefits, which still offers seamless integration with existing hardware and legacy interfaces. VIPA is embedded on all Zenitel products, providing a neat and tidy audio-over-IP solution, and ensuring compatibility with legacy interfaces.

The Result

Combining their expertise in all things PAVA with an extensive portfolio in the rail industry, Zenitel continue to deliver cutting edge solutions for Bane NOR stations, deploying turnkey systems that are customer-centric, reliable, and increasingly efficient.

In particular, the implementation of the iVENCs control system at the Line's Operational Control Centre has streamlined operations for the Norwegian Rail company, linking together Bane NOR stations and infrastructure nationwide with its remote monitoring capability.

Zenitel's next generation VAIA PAVA controller / amplifier provides a solution that out-performs its predecessor while offering a more sustainable solution for Bane NOR. Its successful integration in the Follo Tunnels is testament to this.

Zenitel continues to adopt a progressive approach to technology and continue to invest heavily into extensive research and development programs, ensuring that they are ready to answer the questions of tomorrow and be well placed to deliver for many years to come.



“We are very pleased that Bane NOR have awarded us this strategically important framework. The framework builds on our previous experiences and ensures the thousands of daily passengers stay protected and informed.

We look forward to delivering hugely important projects and we're very much looking forward to continuing the journey with Bane NOR.,”

**- Henry Rawlins,
Account Manager**



Why Zenitel?

Zenitel is well positioned to drive the future of intelligent critical-communication solutions. Through our portfolio of IP products & solutions, with built-in intelligence and a focus on cybersecurity, we provide organizations with superior, scalable security and flexibility. Zenitel is the proven, preferred choice for environments requiring crystal-clear audio to ensure the protection of human life, property, assets and the management of critical activities. With interoperability at all levels, we seamlessly integrate with access control, video management and security platforms.