



Market Segment:
Rail Infrastructure

Country of Installation:
Scotland, Europe

Year of Installation:
2010 - 2022

End customer:
ScotRail

Solutions:
Public Address

Key Products:
Long Line Public Address (LLPA), iPAM, iVENCs

Key Technology:
VIPA Audio Distribution

Integrator:
Various

Long Line Public Address on Scotland's Railway

Zenitel deliver Long Line IP-based Monitored Public Address systems to stations throughout Scotland, combined with a centralised control system to help provide effective remote monitoring and control of ScotRail's sites.

The Customer/End User

ScotRail operates a large majority of the railways and stations within Scotland, serving over 350 Scottish rail stations on intercity and suburban routes. The physical infrastructure itself is owned and managed by Network Rail. In April 2022, the rail service was transferred into public ownership. Zenitel has an extensive history with ScotRail, under the previous ASL brand, and has supplied ScotRail with PAVA systems since 2010, right up to the present day. Over the course of the 12 years, Zenitel has delivered PA across a staggering 275 stations including 33 stations for Motherwell, 68 for Dunfermline, 24 for Inverclyde, 38 for Glasgow, 78 for Yoker, with another 34 stations being installed on the Ayrshire line in 2022.

The Requirement

Each year, ScotRail serves over 90 million passenger journeys, and that number is forecast to increase in the future. To cope with this demand, it is essential that all PAVA technology is reliable and long-lasting. Zenitel's design and implementation philosophy ensures this is the case, which explains the thriving relationship between the companies.

For the original project, Long Line IP-based Monitored Public Address (LLPA) was installed at stations across the Central Glasgow region. A key aspect was the inclusion of a singular, central control system that would connect all of the disparate rail sites via IP over the low bandwidth legacy Long Line PA cabling, as well as providing remote monitoring and control. The system was then expanded sequentially over the following years,

with Zenitel providing PA systems for 275 stations, requiring the full scope of Zenitel's services.

Their remit included the overseeing of the hardware design and supply stages, as well as maintenance and support of existing sites.

One of Zenitel's key strengths is the comprehensive service cycle that they offer the system designers, installers, and end clients. Being involved in the process every step of the way means that Zenitel can act promptly, with a wealth of information available, to align closely with the clients' requirements. This results in a more flexible and holistic relationship – making it easier to increase the scale of operations in the future – an attractive prospect for transportation networks.

The Solution

To ensure reliable communications across all stations, Zenitel provided each station with its own iPAM400 IP Amplifier Mainframe. These fanless 2U amplifiers provide a stand-alone single-box solution of amplification,

loudspeaker line monitoring, routing and of course IP connectivity. This technology from Zenitel interfaces seamlessly with the lines' existing Passenger Information Systems (PIS), delivering scheduled, synchronized audio and visual announcements across all stations, significantly streamlining and automating operations.

Similarly, each line was equipped with an ASL iVENCs Long Line PA Control System. This enables ScotRail operators to broadcast live to the PA systems at every station, as well as delivering scheduled information. The iVENCs system provides a detailed 2D Graphical User Interface (GUI) which consists of a top-down overview map of the entire networked system. This intuitive display makes it easy to broadcast to any individual station or groups of stations, to access specific event logs and data for each location, and of course to monitor any faults remotely.

A key benefit of the LLPA technology is the ability to suppress specific PA zones depending on time of day, or message type. This facility is important to minimise noise disruption to nearby residents, and is

particularly useful in times of disruption. Thus, announcements for specific stations can be shut off to minimise misinformation at these times, when the supplied train running information may not be correct.

An added advantage is that this technology can save ScotRail a significant amount in running costs. Furthermore, it signifies a more deliberate approach to energy usage, which will help the nationally owned company meet its sustainable development goals.

The newest addition to the ScotRail LLPA systems will extend the Zenitel equipment to cover a line for the Scottish county of Ayrshire. Working towards completion in 2022, the project's scope covers the addition of thirty-four stations, and an accompanying control system. The station PA hardware will also be based

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around the intelligent amplifier, the ASL iPAM400. To ensure that the hardware functions appropriately, a representative system was assembled and tested at Zenitel's site in Lewes, before being subjected to rigorous FAT testing. The system's hardware has now been delivered to AmcoGriffen Limited, who will carry out the installation.

The control equipment for the Ayrshire LLPA is the latest updated version of the iVENCs PA Control System as installed previously at both the Paisley and Dunfermline control centres and will also be housed in the Paisley operational control centre. This consists of two dual-redundant iVENCs PA Servers plus an operator's workstation PC, which will provide LLPA Microphone and PC/DVA functions as well as fault reporting capabilities.

Perhaps the most prevailing challenge was providing the system's controls and status reporting in a way that works for ScotRail's employees, not against them. Fortunately, ASL's iVENCs system is the perfect solution to this issue. It collects all the LLPA equipment's data from the disparate rail stations and provides it in a neat format for staff to access,

allowing critically informed decisions to be made. The system can be configured to provide separate alarm lists for the operators and maintainers, ensuring that all the staff receive the information that they need, without clutter and detail that they don't need.

Likewise, the iPAM400 was designed specifically to combat many of the common challenges associated with major transport infrastructure Long Line PA and Voice over IP projects:

It provides a modular, all-in-one solution: one or more amplifier modules may be fitted depending on each station's requirements, making it an extremely flexible solution that is perfectly suited for rural Scotland, where station size varies significantly. The adaptive class-D amplifier technology in the iPAM makes for a very efficient and advanced solution.

Additionally, the iPAM offers two multifunction audio input and serial I/O ports. Naturally, this plays well with other ASL equipment, such as microphones and other audio sources, but can also integrate with existing infrastructure to simplify system integration.

"We are proud to have worked with Scotrail for many years, collaborating on every iteration of hardware, from IPAM to our next-generation VAIA IP amplifier hardware.

The success of our partnership is built on mutual trust and innovation, and we look forward to continuing this fruitful collaboration in the future

**- Henry Rawlings
VP Marketing and
Product management
Zenitel**

The Result

Over the years, Zenitel has worked closely with ScotRail to deliver an extensive LLPA system that connects and centralises 241 stations under their jurisdiction. They are currently integrating a further thirty-four stations to this network with the forthcoming Ayrshire line. With their enhanced overview of the network, ScotRail can more effectively manage their resources and protect the company's investment while reducing all upfront, installation and future running costs.

Last, but not least, Zenitel has worked with ScotRail to add extra functionality into the system at ScotRail's request, and to help to improve the day-to-day travelling experience. With the implementation of smart remote monitoring and announcement controls, passengers are updated with critical information at the press of a button, while avoiding incorrect announcements in times of disruption. The PA allows the passengers to hear, and the ScotRail operators to be heard and be understood, every time and everywhere.

“ScotRail has a fantastic working relationship with Applications Solutions (Safety and Security) Limited (ASL). Throughout our partnership, Zenitel has continuously delivered for ScotRail by listening to our needs and working with us to create solutions.

The LLPA system provided has proven to be reliable, and when things haven't gone to plan, the support that Zenitel has available has been excellent.”

- Anne Gray,
Customer Information Strategy



Why Zenitel?

Zenitel is well positioned to drive the future of intelligent critical communication solutions. Through our portfolio of IP products and solutions, with built-in intelligence and a focus on cybersecurity, we provide organisations 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-