



## smartVES PAVA system in Passenger Information Systems applications

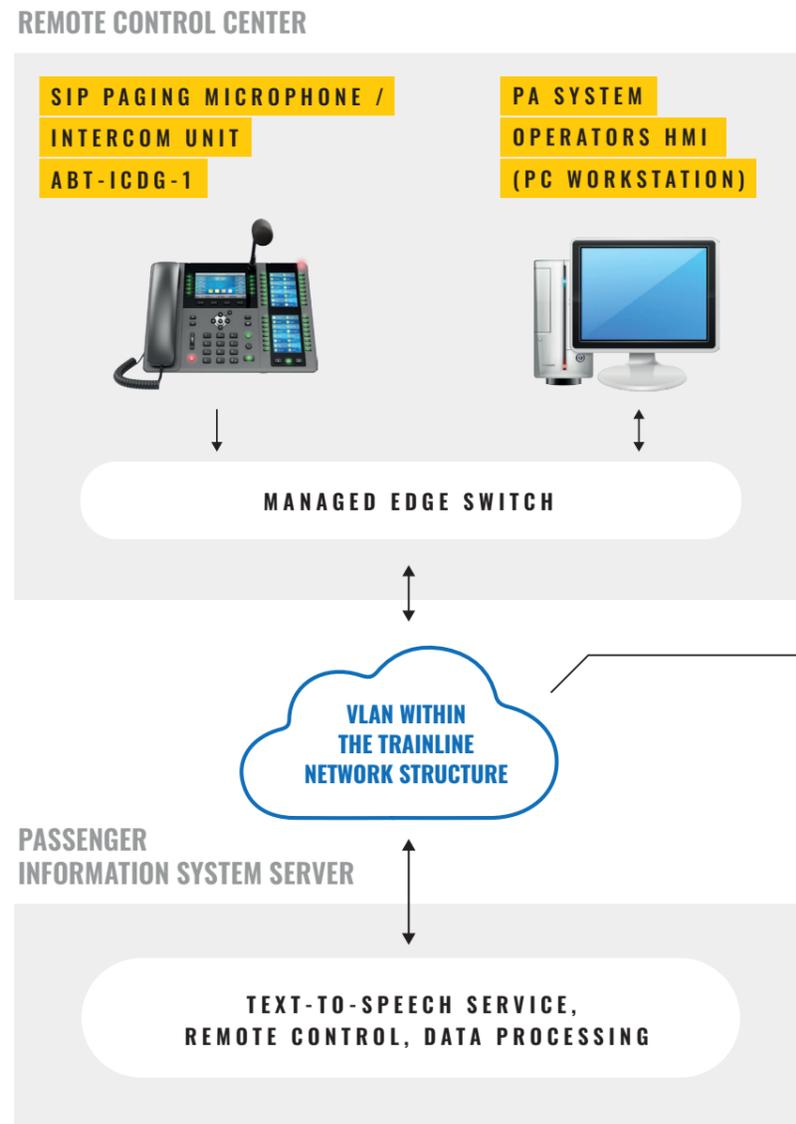
Intelligent sound adaptation to all acoustic conditions.



We make everyday life safer

# Networkable PAVA system

smartVES is a modern, TCP/IP base, networkable Public Address and Voice Alarm system. smartVES is designed to work in large scale distributed system configurations. Its primary tasks in Passenger Information Systems applications is to provide travellers information about the train timetable, railway traffic and services, as well as general safety and security messaging. The smartVES system is certified for the EN54 standard for Voice Alarm and it's components are tested to be compliant with multiple railway standards such as the EN 50121-4 and EN 50125-3.



The smartVES PAVA system is designed to interface with the Passenger Information System (PIS). Voice messages are automatically generated by the PIS Text-to-Speech speech service and then streamed to the PA system via ISE VES GATEWAY servers. smartVES supports two types of architecture – with a GATEWAY server at each station, or redundant pair of GATEWAY servers located at Control Centres (in this case each managing multiple sites). A local smartVES system configuration shall consist of a number of SMART-CU11 control units, each managing a stack of 100V power amplifiers, redundant power supply, noise tracking devices and loudspeakers. smartVES provides a unique Adaptive Filtration feature, allowing the system to adapt its frequency response to react to the magnitude and spectrum of the background noise, in real time.

## THE SMARTVES SYSTEM INCLUDES:



# Enhancement of spoken messages

The speech temporal transposition algorithm (STTA) naturally and evenly changes the pace and duration of messages spoken in real time through smartVES paging microphones (DFMS, DMS, DMS-LCD).

PAVA systems are not only used to broadcast pre-recorded and processed messages, but also by live speakers, who sometimes are not trained to properly use a microphone. Even a trained speaker, while under stress, can start to speak faster, or to stutter. It is often overseen, that a speaker's individual characteristics such as intonation and the pace of speech can affect the intelligibility of the message.

When a speech signal is detected, the system determines its rate while buffering the signal. Then, based on the value of the STI index measured in the auto-calibration process, the instantaneous value of the deceleration factor of the speech signal is determined. As a result, the output of the STTA algorithm obtains a natural speech sound, the pace of which is adjusted to the acoustic conditions in the area of broadcasting.



# Noise tracking

The Adaptive Filtration algorithm also enables the smartVES to adapt the system frequency response in real time which in turn decreases the negative impact of noise on the speech intelligibility.

Many PAVA systems are fitted with a noise tracking feature, allowing the system to automatically attenuate the Sound Pressure Level output to a zone, based on the reading of a noise sensor.

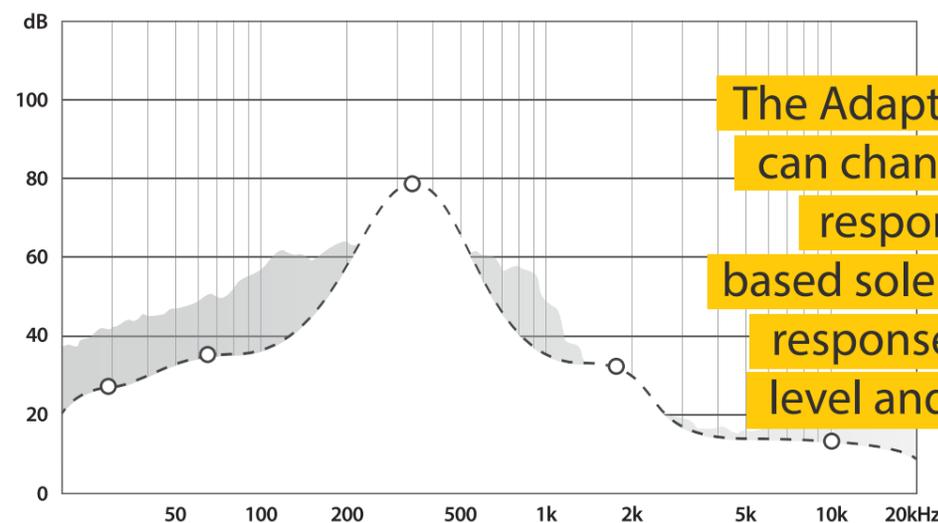
This helps maintain a healthy Sound-to-Noise ratio (SNR). It is worth noting that in this process, the entire frequency range is usually attenuated by the PAVA system which can result in:

Excessive power consumption

Constant increase of output levels

Increased sound reflections

Decreased speech perception



It's crucial to understand that the noise frequency affects how we hear other sounds. Noise at a certain frequency can make it harder to hear sounds at that frequency and higher ones. To deal with

this, our solution doesn't reduce all frequencies but uses filters to keep the signal-to-noise ratio balanced in specific frequency ranges.

# System control unit

## SMART-CU-11LCD



The SMART-CU11 is a sound processor – taking the role of the PAVA systems audio matrix, network interface, DSP unit and speaker line surveillance module. A single SMART-CU11 can power up to 11 zones. Larger systems can be created by using multiple SMART-CU11.

The SMART-CU11 is fitted with a redundant network interface, providing both copper and fibre optic connection. All in-system audio and control signals shall be transmitted digitally between any-and-all points of the PAVA audio network.

The SMART-CU11 is equipped with a built-in multichannel DSP unit, providing sound processing tools such as: limiter, delay (up to 30sec), PEQ and Feedback Suppressor.

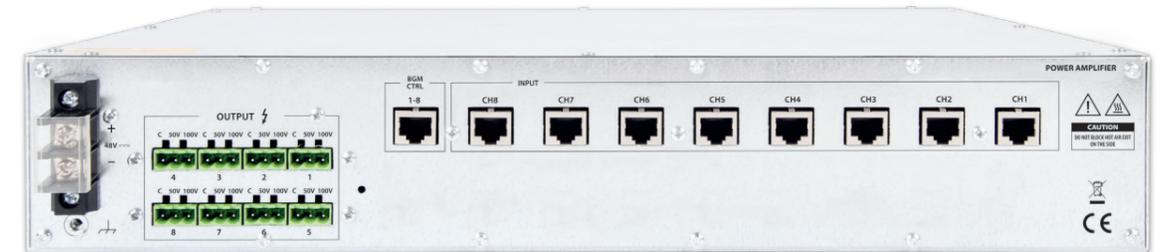
Each SMART-CU11 allows to control an amplifier stack of up to 12 amplifiers, including up to 4 standby amplifiers. The standby amplifiers shall be triggered automatically in case of detecting a functional amplifier failure.

### CHARACTERISTICS

- » **Audio matrix with built-in sound processor and networking**
- » **Scalable modular configuration**
- » **Built-in network switch with fibre optic ports**
- » **Monitoring of connected amplifiers**
- » **Monitoring of connected loudspeaker lines**

# Power amplifiers

## SMART-PA8080 / SMART-PA4160 / SMART-PA8160 / SMART-PA1650 / SMART-PA2650



The smartVES range of amplifiers includes five one- and multi-channel units. Each is a high efficiency D-class power amplifier designed for use in high impedance loudspeaker systems (100V/50V). The smartVES amplifier allow for channel bridging. The smartVES amplifiers are housed in 2U chassis for 19" rack installation.

### CHARACTERISTICS

- » **High efficiency D-class amplifiers**
- » **Output switchable between 100V/50V**
- » **Indicator lights on the front panel: power, standby, fault information**
- » **Connected loudspeaker lines shall be monitored for: short circuit, open circuit and ground fault**
- » **Individual protection for each amplifier channel**

**SMART-PA8080** / Class D power amplifier, 8 × 80 W  
Bridgeable to: 1 × 160 W + 6 × 80 W; 2 × 160 W + 4 × 80 W;  
3 × 160 W + 2 × 80 W or 4 × 160 W

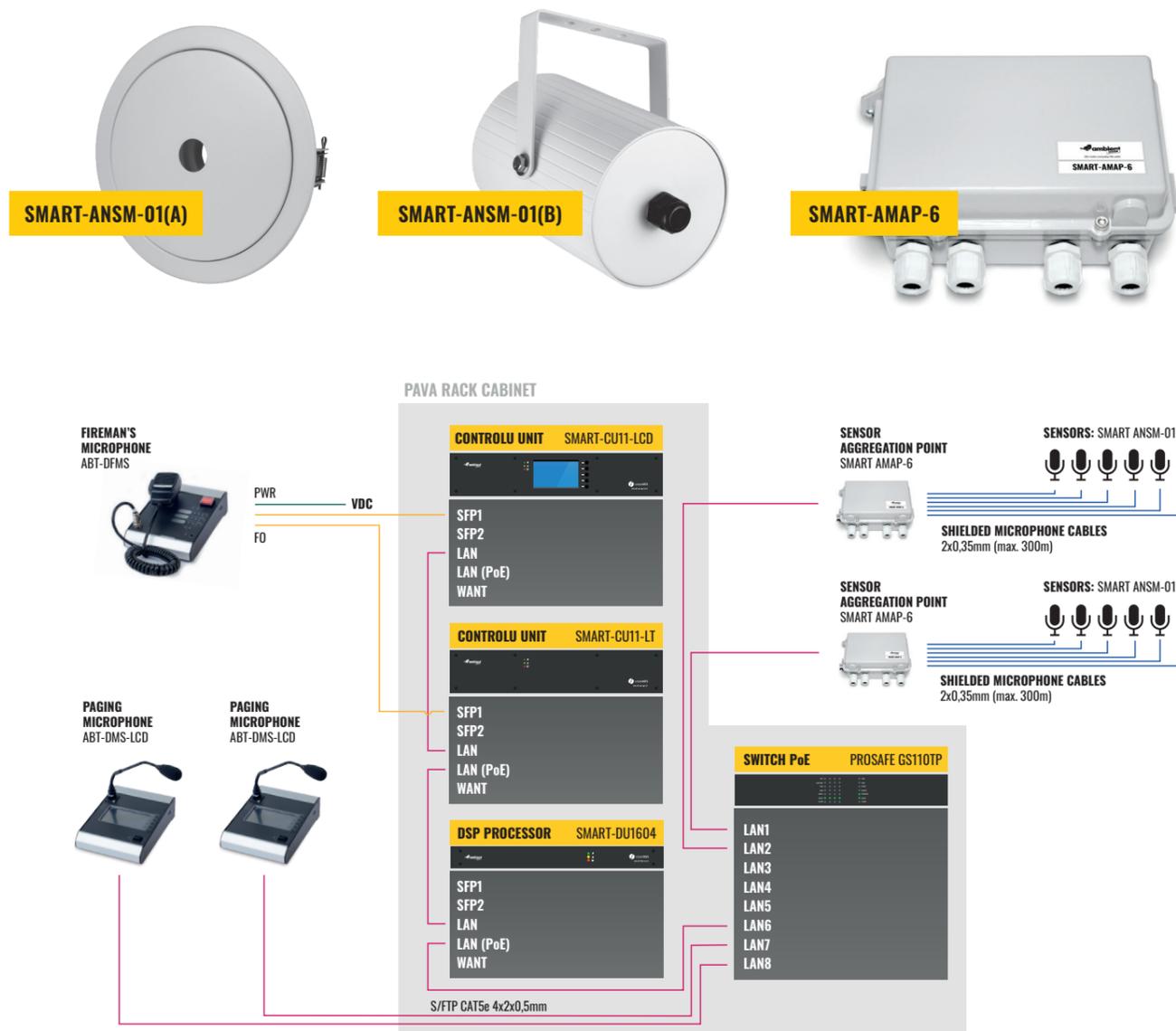
**SMART-PA4160** / Class D power amplifier, 4 × 160 W  
Bridgeable to: 1 × 320 W + 2 × 160 W or 2 × 320 W

**SMART-PA8160** / Class D power amplifier, 8 × 160 W  
Bridgeable to: 1 × 320 W + 6 × 160 W; 2 × 320 W + 4 × 160 W;  
3 × 320 W + 2 × 160 W or 4 × 320 W

**SMART-PA1650** / Class D power amplifier, 1 × 650 W

**SMART-PA2650** / Class D power amplifier, 2 × 650 W  
Bridgeable to: 1 × 1300 W

# Advanced noise tracking feature



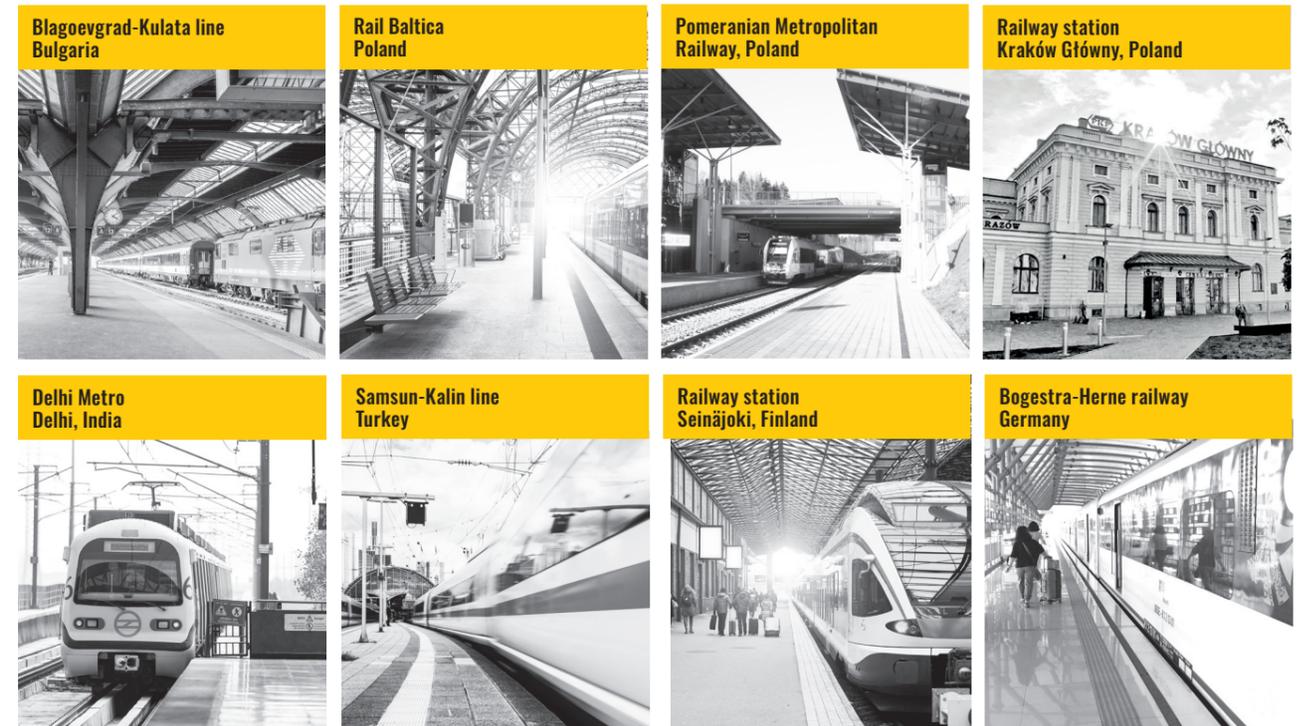
The smartVES system allows to track, in real time, the level and spectrum of background noise. The system shall automatically adapt the DSP settings to maximise the speech intelligibility in given conditions. The smartVES allows to use the noise tracking equipment

to automatically self-calibrate. During this process the system can check if the current SPL/STI rating meets given requirements and can report this status to external third party managing systems.

## ADVANTAGES OF THE SOLUTION

- » *Increased speech intelligibility*
- » *Decreasing sound output to the train stations surroundings*
- » *Positive impact on the environment by reducing electricity consumption*

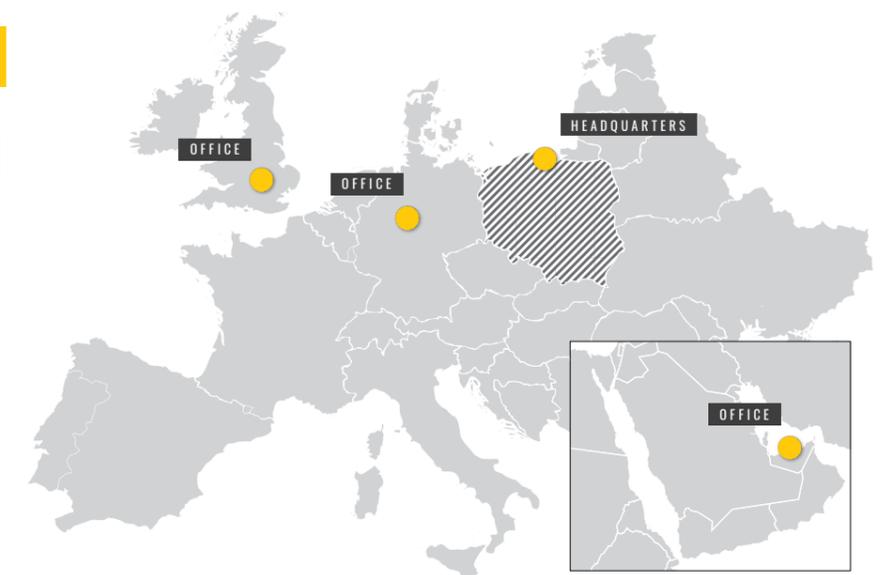
# References



## CONTACT

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