



Introduction to smartVES PAVA System

The smart approach to better understanding



We make everyday life safer



Role of PAVA Systems

Spoken messages provide a more efficient means of alarming and evacuating people than electronic sounders, bells and emergency signs commonly used for Fire Alarms.

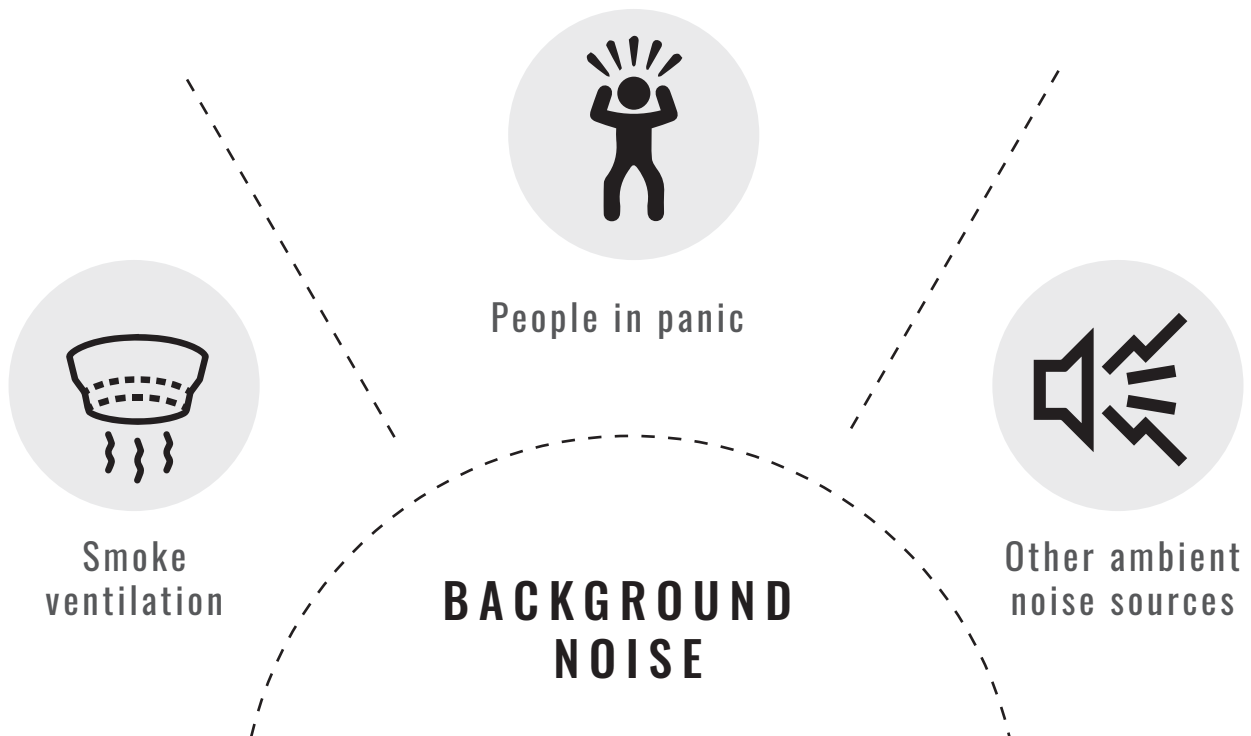
The main task of a Public Address & Voice Alarm (PAVA) system is to provide intelligible voice messages, which can give precise and detailed instructions in case of an emergency. This increases the likelihood of people taking the correct actions, whilst at the same time decreasing the risk of a general panic. Clear message delivery in PAVA systems is vital. It is of the utmost importance to ensure that the message being repro-

duced by the PAVA system is understood loud and clear. International standards like CEN/TS 54-32:2015 and BS 5839-8:2023 set acoustic benchmarks for designers and installers, considering factors like noise and room acoustics. Achieving good intelligibility is not an easy task, as many factors should be taken into account, which are often difficult to foresee at the design stage.

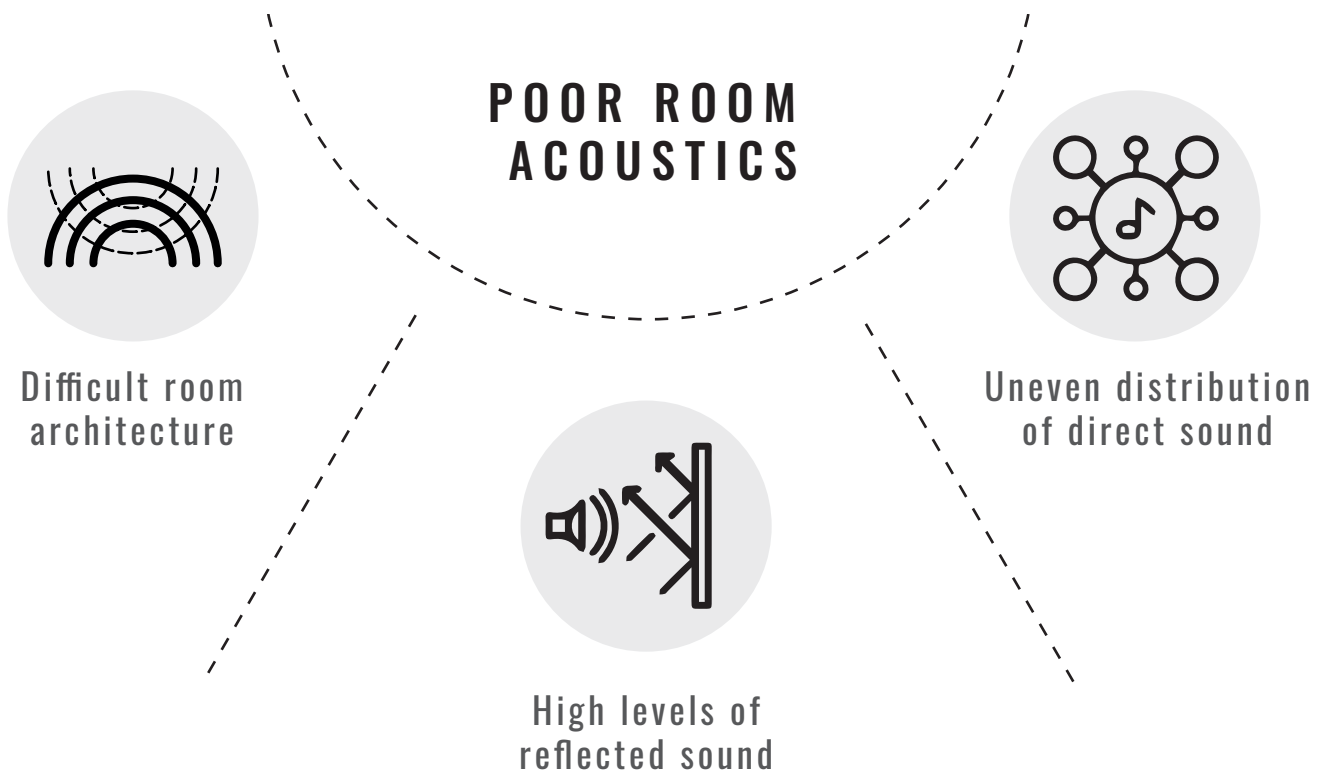
That is when the EN54 certified smartVES PAVA system is the ideal solution. This cutting-edge system combines a distinctive set of following features:

Increases the perception of speech.

Decreases the risk of not meeting the speech intelligibility criteria for Voice Alarm.

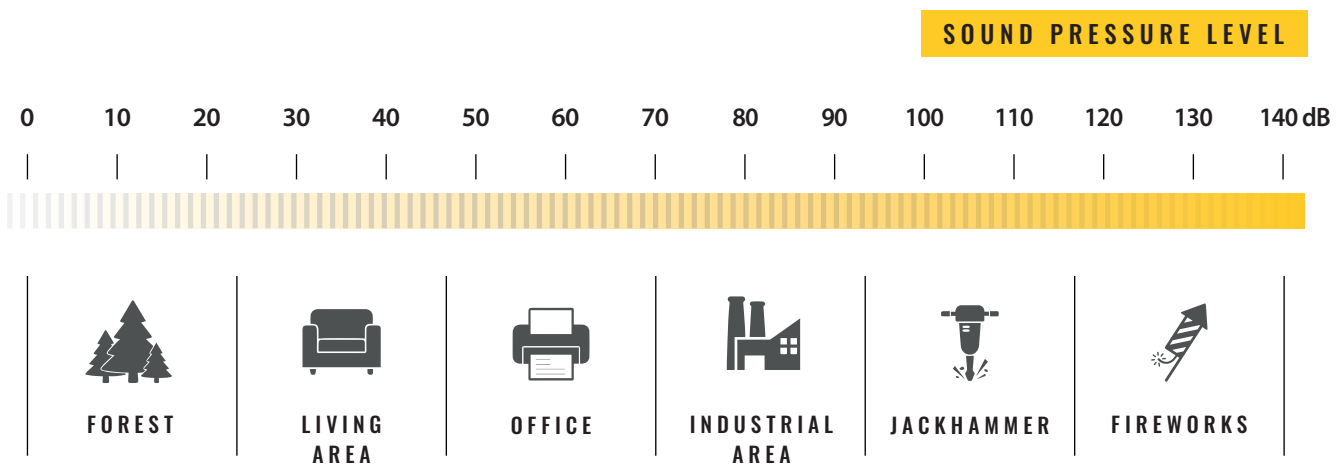


Main challenges of PAVA systems



Sound to Noise Ratio

Intelligible voice communication amidst background noise necessitates a good signal-to-noise ratio, of at least 10 dB. This headroom shall ensure the message be understandable for the listeners.



Reverberation

Reverberation is a natural phenomenon where a room responds to the presence of an acoustic signal, by the rise of reflected sound. Reverberation Time indicates the time needed to for the sound in a room to fade away after the sound source is silenced. When a room with a long Reverberation Time is stimulated with sound, it will result in a large number of sound reflections. This reflected sound, makes it harder to understand speech and is considered as noise when measuring for intelligibility.



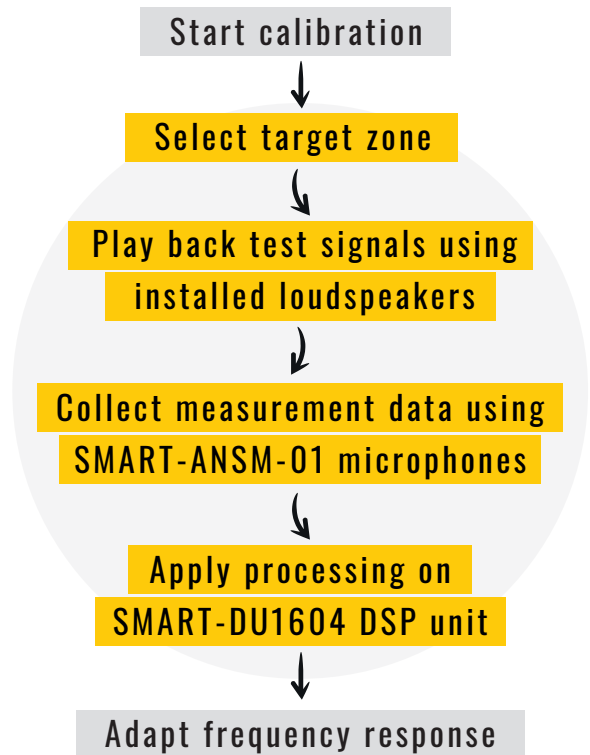
Digital Signal Processing Tools

It is possible to increase the perceived sound quality and speech intelligibility generated by a PAVA system via DSP processing. The purpose of such sound tuning is to optimize the frequency response of the PAVA system to match the loudspeakers and room characteristics.

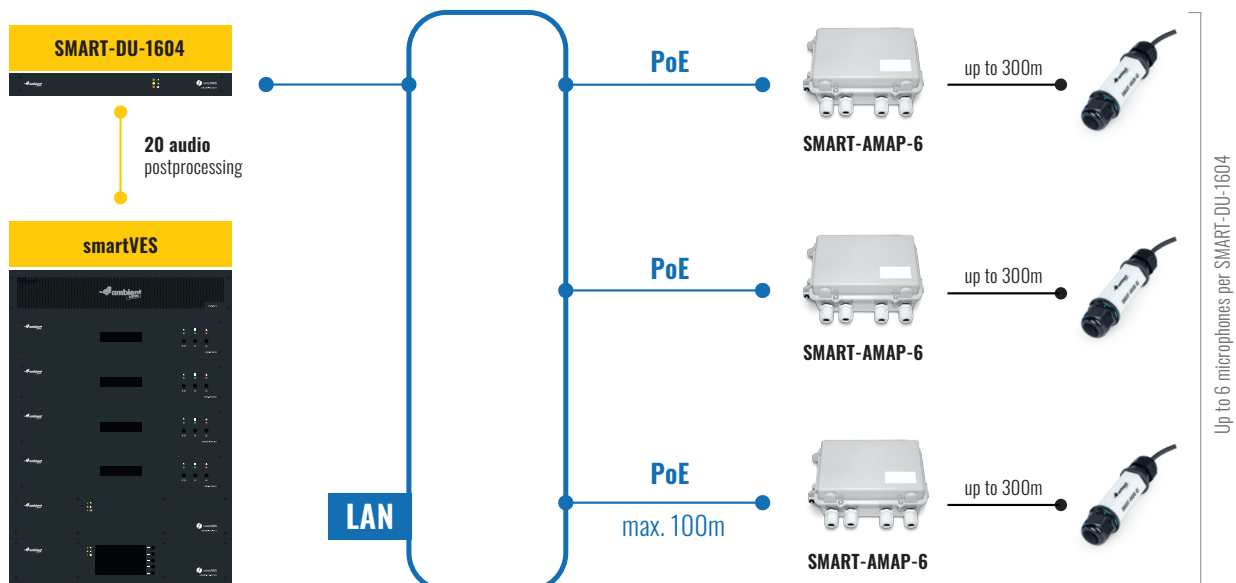
Most modern PAVA systems are in fact equipped with advanced DSP processing capabilities. However, to properly use those capabilities, knowledge in the field of electro-acoustics is required. In practice this type of acoustic compensation has been carried out manually which not only is very time consuming, but also requires access to specialised tools such as sound meters and generators. It also requires specialised skills and knowledge in acoustics. As a consequence, PAVA systems are either fine-tuned exclusively by experts or left untuned entirely, leaving a critical gap in their performance.

Automated Tuning of PAVA Systems

When starting-up the smartVES system, there's a calibration procedure. For specific areas, the system plays back a series of test sounds, which are to be picked up by the noise sensors (SMART-ANSM-01). Using this data, the system applies acoustic filters to improve speech clarity in those key areas.



This unique feature is provided by the Ambient System patented Adaptive Filtration algorithm operating on board of the DSP processor (SMART-DU1604).



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.

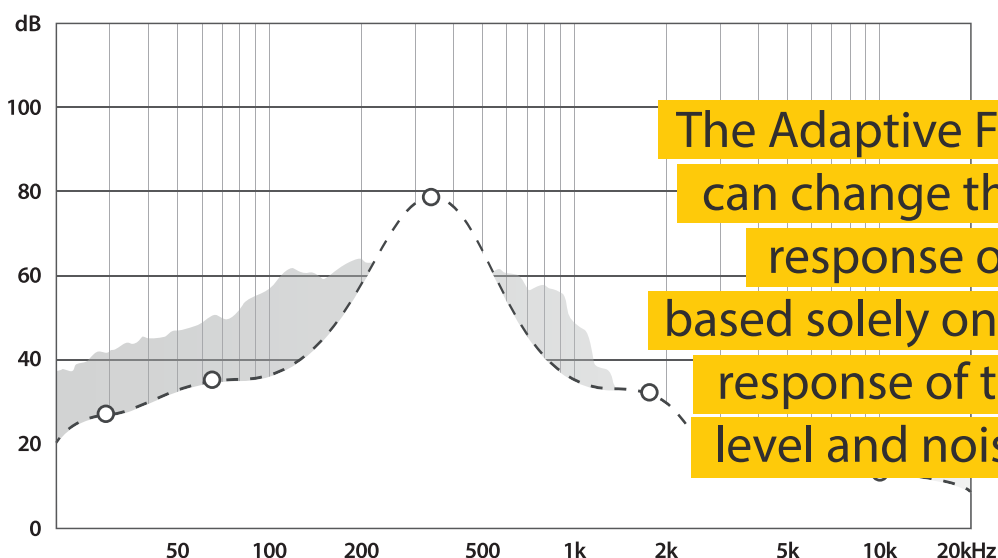
Many PAVA systems are fitted with a noise tracking feature, allowing the system to automatically attenuate the Sound Pressure Level output to a zone, based on the reading of a noise sensor. This helps maintain a healthy Sound-to-Noise ratio (SNR). It is worth noting that in this process, the entire frequency range is usually attenuated by the PAVA system which can result in:

Excessive power consumption

Increased sound reflections

Constant increase of output levels

Decreased speech perception

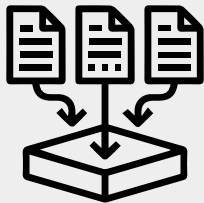


It's crucial to understand that the noise frequency affects how we hear other sounds. Noise at a certain frequency can make it harder to hear sounds at that frequency

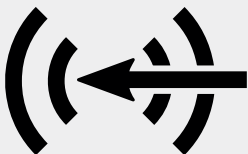
and higher ones. To deal with this, our solution doesn't reduce all frequencies but uses filters to keep the signal-to-noise ratio balanced in specific frequency ranges.

Monitoring of Quality and Performance

As a by-product of the Adaptive Filtration process, the smartVES can provide the user with a unique set of features such as monitoring of the following: sound quality, background noise and system performance.



Delivers real time noise data to thirdparty monitoring systems.



Input data of measurement microphones can be used to confirm if the system is reproducing the sound correctly.



Calibration procedure can be triggered remotely and the output data transferred out. In this way it is possible for the system to selftest STI and SPL levels on demand.

Enhancement of Spoken Messages

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.

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).

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 decel-

eration 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.

Modular System Architecture

The smartVES is a highly customizable, modular, TCP/IP-based, rack mountable PAVA system.



SMART-DU1604 is responsible for modifying systems frequency response according to acoustic conditions in the building in order to maximize speech intelligibility.

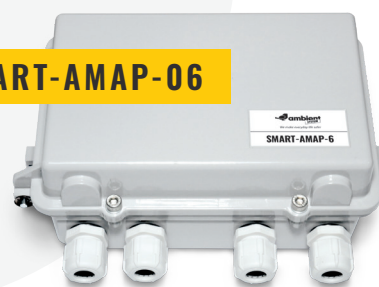


SMART-ANSM-01



SMART-ANSM-01 sensors provide continuous acoustic feedback in monitored area.

SMART-AMAP-06

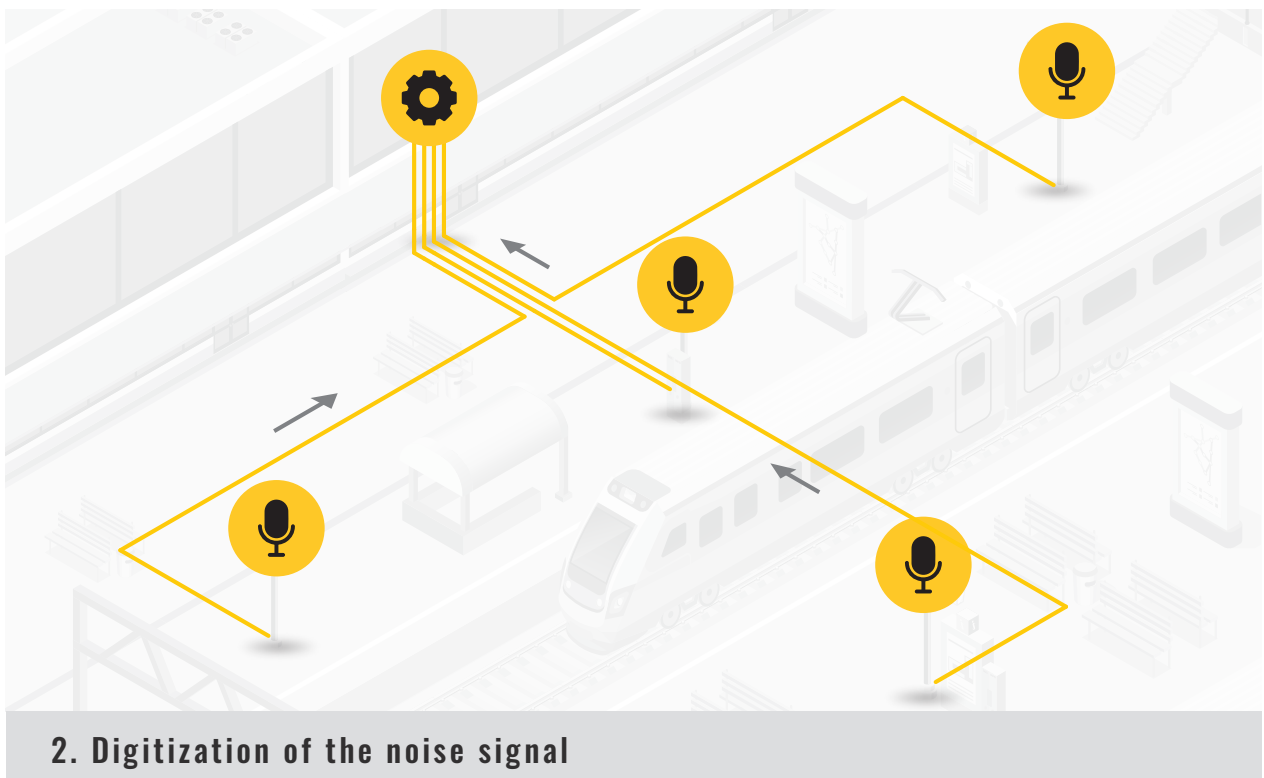


SMART-AMAP-6 preamplifiers communicate acoustic feedback to smartVES core system.

In addition to the standard VA system components, smartVES is equipped with a unique sound processing unit – the

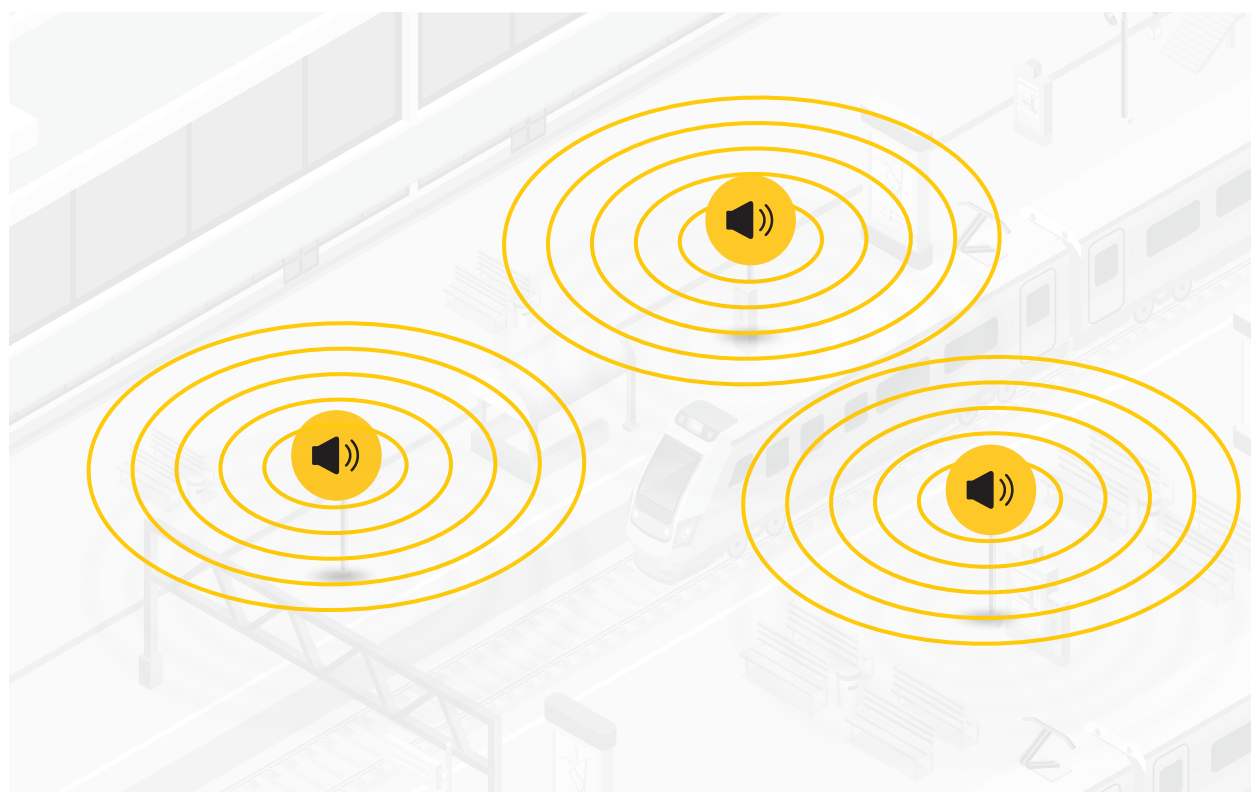
SMART-DU1604, used in combination with SMART-ANSM-01 microphone sensors and SMART-AMAP-6 type preamplifiers.

Adaptive filtration process





3. Voice message processing



4. Improved speech intelligibility

Target Applications

smartVES is a unique solution designed to optimize speech intelligibility in various complex acoustic environments.



MASS TRANSPORT FACILITIES
(train station, airport, metro)



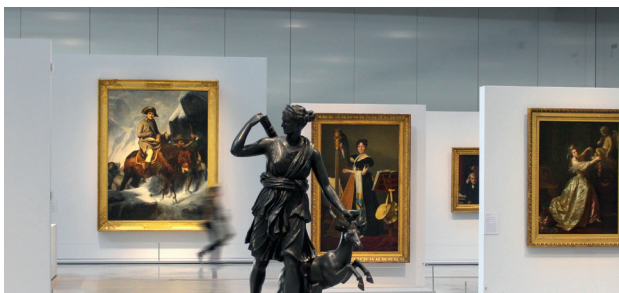
SPORTS FACILITIES
(arena, swimming pool, aquapark)



HOUSES OF WORSHIP
(church, mosque)



PUBLIC BUILDINGS
(shopping mall, exhibition center)



CULTURAL FACILITIES
(congress hall, museum)



INDUSTRIAL FACILITIES
(plant, warehouse)

About us

Ambient System is leading Polish provider of modern PA/VA systems to clients worldwide.

Our projects range from complex installations such as refineries, airports, stadiums, tunnels and shopping centres to medium and small structures like hospitals, train stations, hotels, office buildings, supermarkets or schools.



Headquarters

AMBIENT SYSTEM Sp. z o.o.
ul. Bysewska 27, 80-298 Gdańsk, Poland
T: +48 58 345 51 95
ambient@ambientsystem.pl

Sales

sales@ambientsystem.pl



We make everyday life safer

Wyroby firmy Ambient System są stale doskonałe, dlatego wszystkie specyfikacje podlegają zmianom bez wcześniejszego powiadomienia.

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