



PA/VA

# Pomeranian Metropolitan Rail

## Introduction

**Pomeranian Metropolitan Rail (PKM) is a railway system in Northern Poland in the Tricity area connecting Gdańsk Lech Wałęsa Airport with Wrzeszcz. The line was officially opened by the Prime minister of Poland Ewa Kopacz on 30 August 2015. It has a total length of 55 km and has 18 stations.**

The PKM signal system is the most modern European Train Control System Level 2, which uses no lineside signals but operates instead by wireless transmission of signals to an onboard computer on the train, with signal information displayed on a monitor to the driver. There was also the challenge to deliver a modern digital Public Address and Voice Alarm (PA/VA).



18

stations with  
PA/VA system

55 km

of total  
railway lengthEN  
54-16

compliance

## Challenge

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Key technical requirements of the project included:



**Integration of PA/VA control and monitoring** with third party Central Management Software through SNMP



**Passenger safety** through certified Voice Alarm with recording of all microphone messages in emergency mode



**Preparation of acoustic simulations** to design speaker layouts and achieve **required levels of intelligibility and SPL** within a crowded urban environment to avoid unnecessary noise for neighbours

- » Dynamic routing of audio signals from any station to any other station /group of stations using local microphone controllers
- » Implementation of TCP/IP transmission between the Operation Command Centre (OCC) in Gdansk and the remote stations using the available fibre network
- » Automatic adjustment of the volume during announcements to maintain desired intelligibility for passengers



## Solution

To meet the acoustic challenges of the PKM project, Ambient worked with the system integrator to design the overall system and to **prepare the acoustic simulations and loudspeaker layouts for the 18 stations.**

Two completely different challenges needed to be met in the planning phase. Firstly, many stations are near to residential buildings, so it was necessary to design to minimize the noise impact of messages on local residents. Secondly, some stations are near to sources of high noise levels, e.g. the station at the stadium in Gdynia, so the design criteria included very high sound pressure levels to be able to overcome the noise from the football.

To meet the other technical challenges, Ambient specified and supplied the **MULTIVES platform with YELLOW software.** The architecture is based on Ambient CU8 controllers and fibre optic ethernet connections between stations. The CU8's network card has dual built-in SFP slots to support redundant communication across all network elements.

To maximize the intelligibility in these challenging environments, advanced CU8 DSP features such as multi-band output EQ, feedback eliminator, audio limiter and audio delay of up to 30 seconds were used.

To meet the clients' expectations for **integration of PA/VA with the 3rd party Central Management Software** through SNMP to link the PA/VA equipment with the OCC in Gdansk, Ambient implemented an extended integration interface with monitoring and management features. New features allow more detailed reporting of error conditions down to zone level through SNMP.

Ambient specified their **DMS range microphones** for PKM. Like the CU8 controllers, the fire microphones are equipped with direct SFP's for redundant connection with the OCC. These microphones also offer a Black Box feature that stores audio communications in the system during an emergency situation – recording files including the audio broadcast by the fire microphone, along with time stamp and routing.

At the end of the project, Ambient helped with the successful commissioning of the system to ensure that the **stations achieved STI > 0,5** – an intelligibility rating for voice alarm systems and also to check that the stadium station could achieve the **high sound level with an SPL > 105 dB.**

The functionality of the system is designed in **accordance with EN 54-16**, a mandatory standard for voice alarm systems which has been applicable in Europe since 31st March 2011.

