

PRAESENSA

Public Address and Voice Alarm System



en Architects' and engineers' specifications

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1 Introduction

This document provides the architects' and engineers' specifications of the PRAESENSA system and the individual devices.

1.1 Document history

Release date	Documentation version	Reason
2020.06.16	V1.00	1 st edition
2021.06.10	V1.40	PRA-ANS, PRA-APAS and PRA-APAL added

2 System introduction

With PRAESENSA, Bosch has set a new standard in Public Address and Voice Alarm systems. With all system elements being IP-connected and using state-of-the-art technologies, this system combines cost efficiency and audio quality with ease of installation, integration and use. IP-connectivity and amplifier power partitioning enable new levels of scalability and adaptability, and combined with local backup power facilities this makes PRAESENSA equally suited to both centralized and decentralized topologies. PRAESENSA uses only a few different but very flexible system devices, each with unique capabilities, to create sound systems of all sizes for an extremely wide range of applications. PRAESENSA fits to an office with background music in the reception area and some occasional calls, as well as to an international airport with many simultaneous (automated) announcements for flight information, and carefully selected music programs in lounges, restaurants and bars. In all cases, it can be installed to operate also as a certified voice alarm system for mass notification and evacuation. System functions are defined and configured in software and system capabilities can be enhanced via software upgrades. PRAESENSA: one system, endless options.

3 Architects' and engineers' specifications

3.1 System

Architects' and engineers' specifications

The Public Address and Voice Alarm System shall be fully IP-network based. All system devices such as system controller, amplifiers and call stations shall communicate via IP, using an Audio over IP (AoIP) protocol that supports AES67 for audio and using AES70 for control, with encryption and authentication to prevent unauthorized access, misuse and modification of data. The audio part shall support Layer 3 connections via routers between subnets with latency of less than 10 ms and synchronized outputs. The control data part shall be guaranteed by Transmission Control Protocol (TCP) Layer 4. The system shall support >100 simultaneous channels for music routing and making calls, using an uncompressed, high-definition digital audio format with 24-bit sample size and 48 kHz sample rate. A system based on a single system controller shall support at least 200 system devices and 500 zones. System functionality shall be defined in software, allowing for regular updates for functional and/or security improvements. The system software shall run on the system controller with additional firmware on other system devices for device-related functions. Upload and installation of new firmware into the system devices shall be secure. System configuration shall be possible using a standard web browser, connected to the embedded webserver in the system controller, using HTTPS (HTTP Secure) communication. It shall support multiple access levels with associated access rights. After completion of the system configuration, no connection to a PC shall be required for operation. It shall be possible to connect a backup system controller for dual redundancy with automatic fail-over. The system software shall support the discovery and assignment of all system devices in a system and the individual configuration of each device. The system software shall support configurable call definitions for user calls and related actions that can be assigned to virtual and/or real control inputs and call station buttons. A call definition shall define the following: priority, start and end tones with volume setting, an audio input for live speech insertion with volume setting, a message or sequence of messages with a number of repetitions and volume setting, maximum call duration and optional automatic scheduling with duration and interval. The system software shall permit uploading of individual wav-files for messages and tones to the system controller, with integrity supervision of stored wav-files. It shall support zone definition and zone grouping with amplifier channel to zone assignment. The system software shall configure and control all device inputs and outputs in the system, including audio processing functions, operation modes, assigned functions and connections and the supervision thereof. The system shall include diagnosis and logging software, supporting different modes of inquiry, including call events and fault events. It shall be possible to view fault events, collected by the system controller, on a call station screen, including the fault status of connected third party equipment. It shall be possible to acknowledge and reset faults and alarm states, and to log these actions.

The system devices shall be certified for EN 54 / ISO 7240, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The system shall be a Bosch PRAESENSA system.

3.2 System controller (SCL)

Architects' and engineers' specifications

The IP-networked system controller shall be designed exclusively for use with Bosch PRAESENSA systems. The system controller shall dynamically assign network audio channels for audio routing between system devices across multiple subnets. It shall support >100

simultaneous High Definition audio channels (24-bit, 48 kHz) for music routing and making calls, with encryption and authentication to protect against eavesdropping and hacking. It shall be capable of receiving Dante and AES67 audio streams. The system controller shall provide an interface for control data and multi-channel digital audio over OMNEO using an integrated 5-port Ethernet switch for redundant network connections, supporting RSTP and loop-through cabling. The system controller shall have dual power supply inputs and power supplies. The system controller shall manage all devices in the system to provide the configured system functions. It shall incorporate a supervised storage for message and tone files with networked playback of up to eight streams simultaneously. It shall keep an internal log of fault events and call events. The system controller shall provide a secure TCP/IP open interface for remote control and diagnostics. The system controller shall provide front-panel LED indications for the status of power supplies and the presence of faults in the system and provide additional software monitoring and fault reporting features. The system controller shall be rack mountable (1U). It shall be possible to connect a backup system controller for dual redundancy with automatic fail-over. The system controller shall be certified for EN 54-16 / ISO 7240-16, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The system controller shall be a Bosch PRA-SCL.

3.3 **Amplifier, 600W 4-channel (AD604)**

Architects' and engineers' specifications

The IP-networked 4-channel amplifier shall be designed exclusively for use with Bosch PRAESENSA systems. The amplifier shall adapt the maximum output power of each amplifier channel to its connected loudspeaker load, with free assignable output power per channel for a total maximum of 600 watt per amplifier, supporting 70 V or 100 V operation with direct drive capability and outputs that are galvanically insulated from ground. The amplifier shall have a built-in independent spare amplifier channel for automatic failover. The amplifier shall provide an interface for control data and multi-channel digital audio over OMNEO using dual Ethernet ports for redundant network connection, supporting RSTP and loop-through cabling, with automatic failover to an analog lifeline input. The amplifier shall have dual power supply inputs and power supplies. All amplifier channels shall have independent A/B zone outputs with support for class-A loudspeaker loops. All amplifier channels shall supervise the integrity of connected loudspeaker lines without interruption of audio distribution. The amplifier shall provide front-panel LED status indications for the network link, ground fault, power supplies and audio channels, and provide additional software monitoring and fault reporting features. The amplifier shall be rack mountable (1U) and feature software-configurable signal processing including level control, parametric equalization, limiting and delay for each channel. The amplifier shall be certified for EN 54-16 / ISO 7240-16, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The amplifier shall be a Bosch PRA-AD604.

3.4 **Amplifier, 600W 8-channel (AD608)**

Architects' and engineers' specifications

The IP-networked 8-channel amplifier shall be designed exclusively for use with Bosch PRAESENSA systems. The amplifier shall adapt the maximum output power of each amplifier channel to its connected loudspeaker load, with free assignable output power per channel for a total maximum of 600 watt per amplifier, supporting 70 V or 100 V operation with direct drive capability and outputs that are galvanically insulated from ground. The amplifier shall have a built-in independent spare amplifier channel for automatic failover. The amplifier shall provide an interface for control data and multi-channel digital audio over OMNEO using dual

Ethernet ports for redundant network connection, supporting RSTP and loop-through cabling, with automatic failover to an analog lifeline input. The amplifier shall have dual power supply inputs and power supplies. All amplifier channels shall have independent A/B zone outputs with support for class-A loudspeaker loops. All amplifier channels shall supervise the integrity of connected loudspeaker lines without interruption of audio distribution. The amplifier shall provide front-panel LED status indications for the network link, ground fault, power supplies and audio channels, and provide additional software monitoring and fault reporting features. The amplifier shall be rack mountable (1U) and feature software-configurable signal processing including level control, parametric equalization, limiting and delay for each channel. The amplifier shall be certified for EN 54-16 / ISO 7240-16, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The amplifier shall be a Bosch PRA-AD608.

3.5 **End-of-line device (EOL)**

Architects' and engineers' specifications

The end-of-line device shall be designed exclusively for use with Bosch PRAESENSA systems. The end-of-line device shall only require a connection with the end of the loudspeaker line to supervise its integrity. Supervision reliability shall not depend on the number of connected loudspeakers. Supervision shall be inaudible and not interrupt audio content. The end-of-line device shall be certified for EN 54-16 / ISO 7240-16, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The end-of-line device shall be a Bosch PRA-EOL.

3.6 **Multifunction power supply, large (MPS3)**

Architects' and engineers' specifications

The IP-networked multifunction power supply shall be designed exclusively for use with Bosch PRAESENSA systems. The multifunction power supply shall contain four independent mains power supplies with power factor correction and dual output connection facilities to power up to three 600 W amplifiers and to power a system controller and two call stations. The multifunction power supply shall have an integrated battery charger for a connected battery, and independent converters to use the battery as a backup power source for all connected loads in case of mains failures. Failover to the backup battery shall be without interruption of output power. It shall use a single 12 V VRLA backup battery to eliminate the need for battery balancing, while maximizing battery lifetime and power density. The multifunction power supply shall have eight general purpose control inputs with connection supervision and eight voltage free control outputs. The multifunction power supply shall provide an interface for control data and to receive a backup audio channel over OMNEO using an integrated 6-port Ethernet switch for redundant network connections, supporting RSTP and loop-through cabling. Two ports shall have PoE to provide redundant power to a call station. The backup audio channel shall be available as analog lifeline to connected amplifiers. The multifunction power supply shall provide front-panel LED indications for status of the power supply sections, mains and battery, network link and fault presence, and provide additional software monitoring and fault reporting features. The multifunction power supply shall be rack mountable (2U). The multifunction power supply shall be certified for EN 54-4 / ISO 7240-4, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The multifunction power supply shall be a Bosch PRA-MPS3.

3.7 Ambient noise sensor (ANS)

Architects' and Engineers' Specifications

The IP-networked ambient noise sensor shall be designed exclusively for use with Bosch PRAESENSA systems. It shall provide an interface for control data over OMNEO using Ethernet. It shall receive Power over Ethernet (PoE) via its network connection. The ambient noise sensor shall have an integrated DSP for software configurable frequency response adjustments to optimize tracking of disturbing noise signals and/or to minimize the influence of non-disturbing out-of-band signals. It shall be IP54 classified for solid particle and liquid ingress protection. The ambient noise sensor shall be certified for EN 54-16 and ISO 7240-16, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The ambient noise sensor shall be a Bosch PRA-ANS.

3.8 Desktop LCD call station (CSLD)

Architects' and engineers' specifications

The IP-networked desktop call station shall be designed exclusively for use with Bosch PRAESENSA systems. The desktop call station shall provide an interface for control data and multi-channel digital audio over OMNEO using dual Ethernet ports for redundant network connection, supporting RSTP and loop-through cabling. It shall receive Power over Ethernet (PoE) via either one or both network connections. The desktop call station shall provide a backlit full-color capacitive touch panel LCD as user interface for business and evacuation purposes. The desktop call station shall accept up to four optional extensions, each offering 12 configurable buttons for zone selection and other purposes. It shall provide control and routing of live speech calls, stored messages and music with volume control per zone. The desktop call station shall have a gooseneck cardioid microphone for live calls and a 3.5 mm jack line level input for background music, and provide software-configurable signal processing including sensitivity control, parametric equalization and limiting. The desktop call station shall be certified for EN 54-16 / ISO 7240-16, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The desktop call station shall be a Bosch PRA-CSLD.

3.9 Wallmount LCD call station (CSLW)

Architects' and engineers' specifications

The IP-networked wallmount call station shall be designed exclusively for use with Bosch PRAESENSA systems. The wallmount call station shall provide an interface for control data and multi-channel digital audio over OMNEO using dual Ethernet ports for redundant network connection, supporting RSTP and loop-through cabling. It shall receive Power over Ethernet (PoE) via either one or both network connections. The wallmount call station shall provide a backlit full-color capacitive touch panel LCD as user interface for business and evacuation purposes. The wallmount call station shall accept up to four optional call station extensions, each offering 12 configurable buttons for zone selection and other purposes. It shall provide control and routing of live speech calls, stored messages and music with volume control per zone. The wallmount call station shall have a hand-held omnidirectional microphone for live calls and a 3.5 mm jack line level input for background music, and provide software-configurable signal processing including sensitivity control, parametric equalization and limiting. The wallmount call station shall be certified for EN 54-16 / ISO 7240-16, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The wallmount call station shall be a Bosch PRA-CSLW.

3.10 Call station extension (CSE)

Architects' and engineers' specifications

The call station extension shall be designed exclusively for use with Bosch PRAESENSA systems. The call station extension shall offer electrical and mechanical connection facilities for use with a desktop or wallmount call station. It shall provide 12 configurable buttons for zone selection and other purposes. Each button has tactile feedback and a light ring activation indicator, complemented with a set of multi-color LEDs for function related status indications. The call station extension shall have a removable front cover to put language independent button labels behind the front cover. The call station extension shall be certified for EN 54-16 / ISO 7240-16, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The call station extension shall be a Bosch PRA-CSE.

3.11 Ethernet switch (ES8P2S)

Architects' and engineers' specifications

The Ethernet switch shall be a managed 10-port Gigabit switch with eight ports providing PoE and two ports providing SFP sockets for glass fiber transceivers. The switch shall have dual redundant, wide range DC power supply inputs for 24 to 48 V. It shall supervise its DC power supply inputs and port links, and have a fault relay output for fault reporting. The Ethernet switch shall be DIN rail mountable with convection cooling. It shall be certified for EN 54-16 in combination with Bosch PRAESENSA systems for public address and voice alarm purposes. The switch shall be marked for UL and CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The Ethernet switch shall be a Bosch PRA-ES8P2S.

3.12 Fiber transceiver (SFPLX)

Architects' and engineers' specifications

The LX fiber transceiver shall be a wide temperature Small Form-factor Pluggable (SFP) for use with single-mode fiber and IR light with a wavelength of 1310 nm, to cover glass fiber link lengths of up to 10 km. It shall be certified for EN 54-16 in combination with Bosch PRAESENSA systems for public address and voice alarm purposes. The transceiver shall be marked for UL and CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The LX-transceiver shall be a Bosch PRA-SFPLX.

3.13 Fiber transceiver (SFPSX)

Architects' and engineers' specifications

The SX fiber transceiver shall be a wide temperature Small Form-factor Pluggable (SFP) for use with multi-mode fiber and IR light with a wavelength of 850 nm, to cover glass fiber link lengths of up to 550 m. It shall be certified for EN 54-16 in combination with Bosch PRAESENSA systems for public address and voice alarm purposes. The transceiver shall be marked for UL and CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The SX-transceiver shall be a Bosch PRA-SFPSX.

3.14 Public address server (APAS)

{Verstallen Hans (BT/MKW2) : added 05-05-2021}

Architects' and Engineers' Specifications

The advanced public address server shall be an industrial PC acting as a server for the public address system, to add advanced business related public address functions, using connected operator devices. Its pre-installed and licensed software shall allow connected operator devices to control announcements and background music in selected zones, streaming from its own internal memory or from external music portals and Internet radio stations. It shall

offer announcement creation and control facilities to the operator to address selected zones, including message scheduling, live call recording with pre-monitoring and playback, and multi-lingual text-to-speech calls, using on-line conversion services. For security reasons the server shall have two Ethernet ports to connect the device to two different local area networks, one secure network for the public address system, and one corporate network with access to the operator devices and the Internet. It shall have an integrated web server to allow operator devices to be platform independent and use a browser to access the server. The server shall be able to stream up to 10 high quality audio channels into the public address system, using the AES67 protocol. The server shall be marked for UL and CE and be compliant with the RoHS directive. Warranty shall be three years minimum. It shall be optimized for use with a Bosch PRAESENSA system for public address purposes. The advanced public address server shall be a Bosch PRA-APAS.

3.15 **Public address license (APAL)**

Architects' and Engineers' Specifications

The advanced public address license is a code for a single operator device to connect to and access an advanced public address server. It shall be possible to use a PC or wireless tablet as operator device and use multiple operator devices in parallel, requiring as many licenses. Upon connection, each operator device shall be able to control parts of the public address system, using a browser on the device as a graphical user interface, controlled by mouse or touch screen. The graphic user interface shall be optimized for use with a 10" touch screen. The license code shall allow the operator device to have several unique operator profiles on that device, with tailored functionalities for each user. It shall offer easy zone selection for voice announcements, control of background music sources and volume in selected zones, the ability to make live call recordings of announcements with pre-monitoring and playback to selected zones, the ability to do live and scheduled playback of stored messages, and playback of text based announcements with automatic (multi-lingual) online text-to-speech conversion. The advanced public address license shall be used with the Bosch PRAESENSA advanced public address server, PRA-APAS. The advanced public address license shall be a Bosch PRA-APAL.

3.16 **Power supply module (PSM24)**

Architects' and engineers' specifications

The 24 V power supply module shall contain a mains input with power factor correction and a 24 V output. Output current capability shall be 10 A continuous and 15 A peak. It shall be approved to power Bosch PRAESENSA and PAVIRO equipment. The power supply shall be DIN-rail mountable with passive cooling. The power supply shall be marked for UL and CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The power supply module shall be a Bosch PRA-PSM24.

3.17 **Power supply module (PSM48)**

Architects' and engineers' specifications

The 48 V power supply module shall contain a mains input with power factor correction and a 48 V output. Output current capability shall be 5 A continuous and 7.5 A peak. It shall be approved to power one 600 W Bosch PRAESENSA amplifier. The power supply shall be DIN-rail mountable with convection cooling. The power supply shall be marked for UL and CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The power supply module shall be a Bosch PRA-PSM48.



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