Application Note
Interfacing PRAESIDEO with PRAESENSA v1.0

Related Product:	**Severity:**
PRAESIDEO system	☐ Immediate action required
PRAESENSA system	☐ Action strongly recommended
	☒ Informative

Interfacing PRAESIDEO and PRAESENSA

This Application Note describes how a PRAESIDEO system and a PRAESENSA system can be integrated.

Introduction

There are thousands of PRAESIDEO systems installed all over the world. With the PRAESIDEO system going end of life these installed systems often have to be extended.

These installed PRAESIDEO systems can be extended with PRAESENSA systems.

Abbreviations

AN	Application note
SCL	PRA-SCL PRAESENSA System controller
AD608/AD604	PRA-AD608/AD604 PRAESENSA Amplifier
MPS3	PRA-MPS3 PRAESENSA Multifunction power supply
CSLD	PRA-CSLD PRAESENSA Desktop call station
CSLW	PRA-CSLW PRAESENSA Wall panel call station
CST	Either CSLD or CSLW
Extension	PRA-CSE PRAESENSA Call station extension
OI	OpenInterface
CI	Control input
CO	Control output (relay contact)
BGM	Background music
PRS	PRAESIDEO
PRA	PRAESENSA
PC	Computer, desktop or laptop

PRAESIDEO and PRAESENSA system
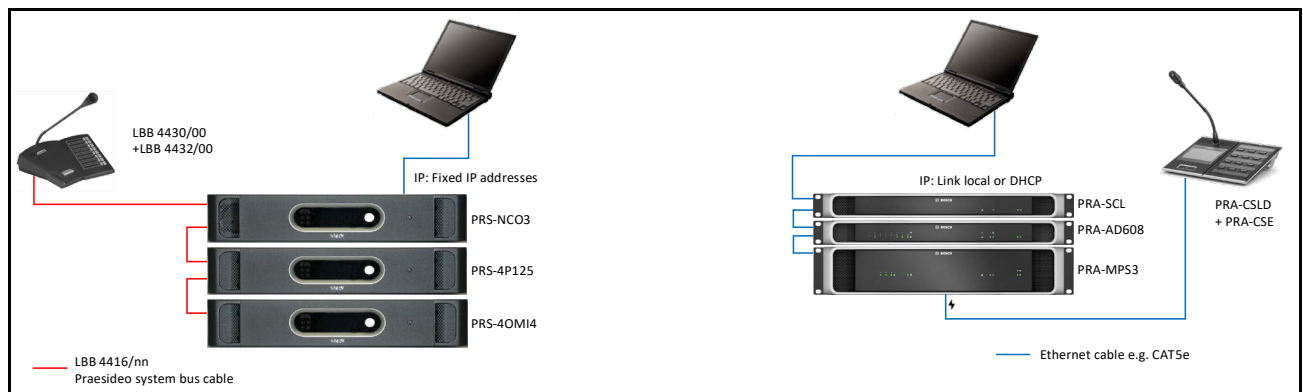
PRAESIDEO and PRAESENSA

Audio connections

PRAESIDEO and PRAESENSA systems are 2 different Bosch product lines where the PRAESENSA system is the latest and next generation PA system.

The PRAESIDEO system has a closed, optical, network and a dedicated protocol to connect the PRAESIDEO devices to the network controller.

The PRAESENSA system is using standard IP technology to connect devices to the system controller.

These 2 networks cannot be directly connected to each other.

However, both systems can use Dante for audio transport between the systems.

Control connections

The PRAESIDEO system and PRAESENSA systems both have an OpenInterface, OI.

Access to the OI of the PRAESIDEO system is via the Ethernet connection on the NCO.

Access to the OI of the PRAESENSA system controller is via the Ethernet network of a PRAESENSA system.

Although both system have the OI, these OI's cannot communicate with each other. This means that both systems cannot control each other, there is also no data exchange between the systems like occupied zone info, fault status info etc.

Dante audio connections

- PRAESIDEO PRS-4OMI4

PRAESIDEO has the PRS-4OMI4, the OMNEO interface, a dedicated network interface which can transmit 4 Dante channels and receive 4 Dante channels.

Increasing the number of PRS-4OMI4's also will increase the number of Dante channels.

- PRAESENSA Dante channels

PRAESENSA can transmit up to 8 Dante channels and receive up to 112 Dante channels.

- Dante audio channels in general

When the OMNEO connection of a PRS-4OMI4 is connected to the PRAESENSA network, audio transfer between the 2 systems is possible.

Control connections

Both, PRAESIDEO and PRAESENSA, have control inputs, CI's, and control outputs, CO's, relay contacts.

Using these CI's and CO's it is possible to have control between the 2 systems. The control is limited but possible.

- Control input (CI)

The CI for PRAESIDEO and PRAESENSA are basically the same. More or less the same functions, sometimes the same function with a different function name.

Naming differences PRAESIDEO vs PRAESENSA

PRAESIDEO	PRAESENSA
Call activation key	Make announcement
Start	Start phased announcement

Using a CI, calls can be started in a system. The properties of the call can be defined in the configuration of the CI.

Calls started with CI's are always complete defined calls, no option to change something in the call.

- Control outputs (CO)

The CO for PRAESIDEO and PRAESENSA are also basically the same. More of less the same functions, sometimes the same function with a different name.

Naming differences PRAESIDEO vs PRAESENSA

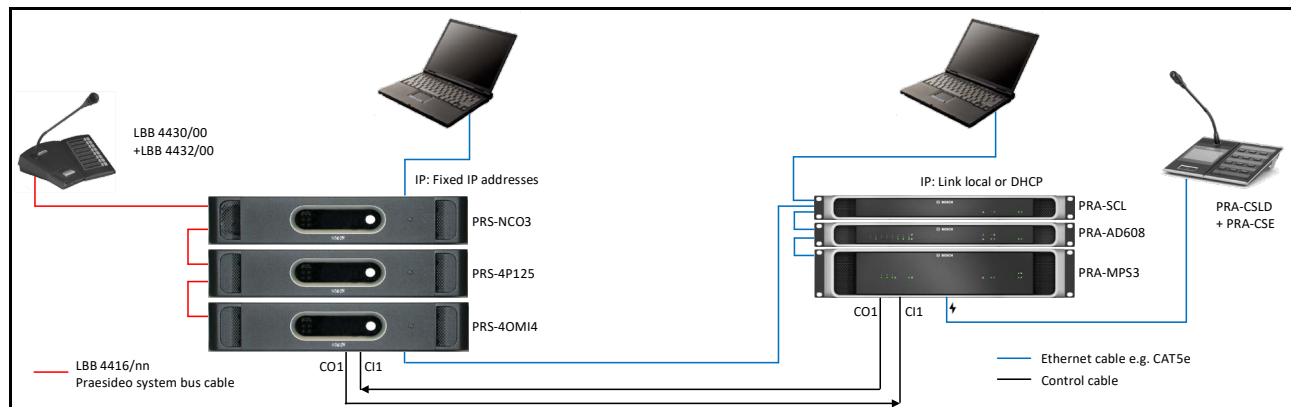| PRAESIDEO	PRAESENSA
Switch output	Switch output
Volume override / Zone active	Zone activity

Connecting a CO of one system to a CI of the remote system, a call can be started in the remote system. The properties of the call in the remote system can be defined in the configuration of the CI of the remote system.

PRAESIDEO – PRAESENSA block diagram

Basic block diagram PRAESIDEO – PRAESENSA

PRAESIDEO devices are connected with the optical system bus cables.

PRAESENSA devices are connected with standard network cables.

For the audio transfer between the PRAESIDEO and the PRAESENSA system, the Dante audio channels, only a single network cable is required between the 2 systems.

> Important for the interconnection between the PRAESIDEO system and the PRAESENSA system is that only the PRS-4OMI4, the Omneo interface, is connected to the PRAESENSA network. Do not connect the Ethernet connection of the network controller, PRS-NCO3, to the network of the PRAESENSA system.

> The Ethernet connection of the network controller has to be connected to a separate network or VLAN.

The Dante audio channels can transfer audio in both directions so from PRAESIDEO to PRAESENSA and PRAESENSA to PRAESIDEO.

These Dante audio channels can be used for business and emergency calls but also to transfer BGM, background music channels.

PC connections

IP settings for the PRAESIDEO and PRAESENSA system are different.

PRAESIDEO uses fixed IP addresses which means the PC network connection also needs a fixed IP address.

The PRAESENSA system has more options.

No DHCP server	: Using Link local addresses, also for the PC
DHCP server	: IP addresses assigned by the DHCP server, also for the PC
Fixed IP addresses	: Available in FW release v1.60

There are 2 ways of connecting PCs to the systems.

- Each system, PRAESIDEO and PRAESENSA, has its own PC.

Each PC has the IP setting needed for the connected system.
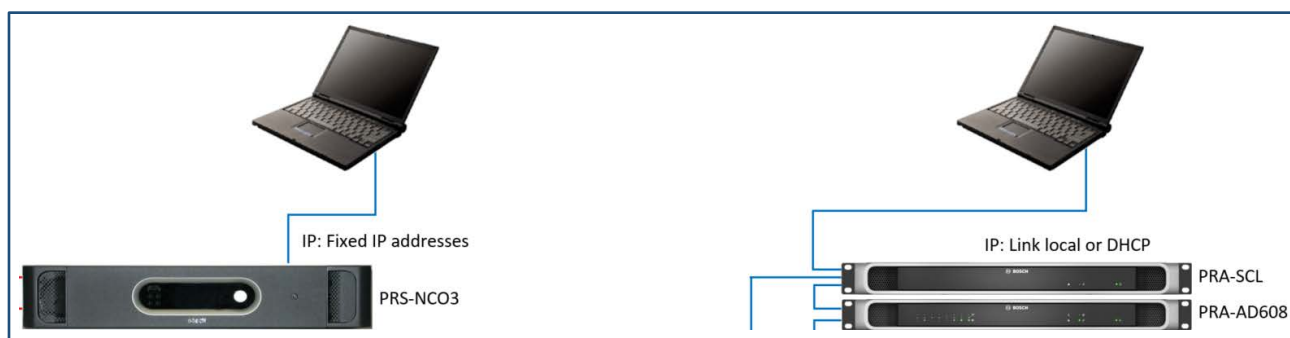
- One PC connected to both systems.

The PC has 2 network ports with each port set to the required network settings.

BGM, background music

The easiest way to transfer audio signals between the systems is audio used for BGM. A BGM audio signal can be transferred without any control.

BGM can be send from a Dante transmitter in one system to a Dante receiver in the other system.

This applies to both system, PRAESIDEO and the PRAESENSA.
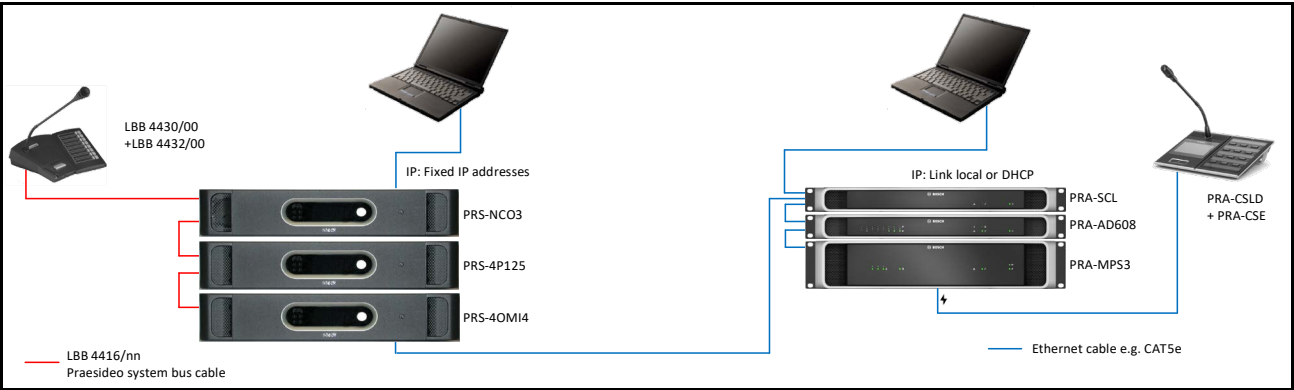
Block diagram PRAESIDEO − PRAESENSA for BGM

PRAESIDEO config

- Basic configuration

The basic system configuration of the PRAESIDEO system will not be described in the AN.

Add the PRS-4OMI4 to the configuration and enable 2 audio inputs, 2 audio output, 1 control input and 1 control output.

- Zone configuration

To be able to transmit audio to the remote system we need to create OMNEO zones. The audio outputs of the PRS-4OMI4 will be used in these OMNEO zones.

We will create 2 zones, 2 OMNEO output channels.

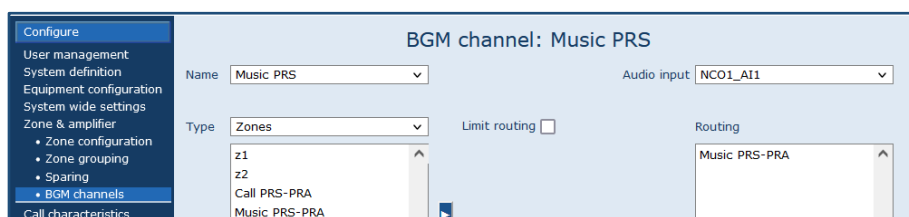For calls <Call PRS-PRA> and for BGM <Music PRS-PRA>.
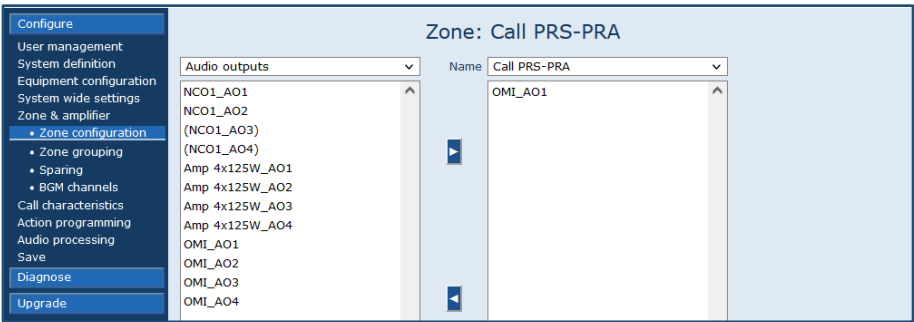
Zone: Call PRS-PRA
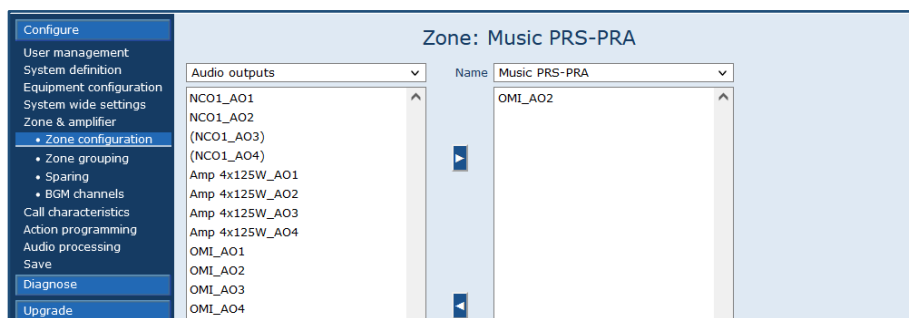
Zone: Music PRS-PRA

- BGM routing PRS-PRA

BGM is always routed to the PRA system so this zone, <Music PRS-PRA>, has to be added to the already existing BGM channel.
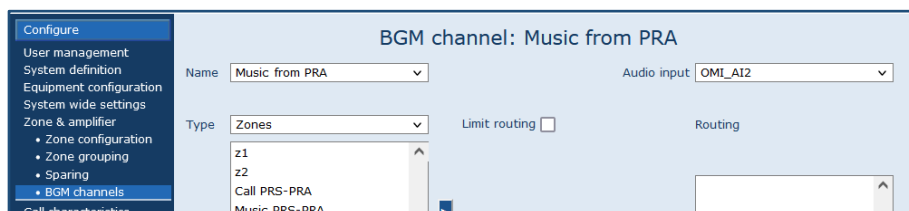

Add <Music PRS-PRA> to the BGM channel

Now BGM is always routed to the PRA system.

- BGM routing PRA-PRS

As we also want to receive and use BGM from the PRA system we need to create a new BGM channel. The BGM signal from the PRA system will enter the PRS system over a Dante channel so the source for this BGM channel will be an Omneo channel.

New BGM channel <Music from PRA>

No zones need to be added because we want to assign this music to the zones on the CST keypads.

Calls

To be able to start a call in a remote system Dante channels for the audio and CO's and CI's for the control connections are necessary.

PRAESIDEO config

- Call macro and start tone

When a call is started from PRS to PRA or PRA to PRS there will always be a short delay in the response of the remote system.

> If a call to a remote system is started, a CO has to be activated that activates the CI in the remote system that then starts the call in the remote system. This will result in a short delay of a few hundred milliseconds. If in the call a start tone is used the result of the delay will be that a few hundred milliseconds of the start tone will not be heard in the remote system but also that the start tone will start with an audible click.

To solve this it is necessary to add appr. 300mS silence before the actual start tone starts.

This means, for the PRS system, that start tones cannot be used and that the start tone has to be a pre-recorded message. The behavior will be the same but a pre-recorded message, used as a chime, we can edit and add the 300mS silence before the actual chime.

Adding the 300mS silence can be done using e.g. Audacity. For a one tone chime it would look like the picture below.
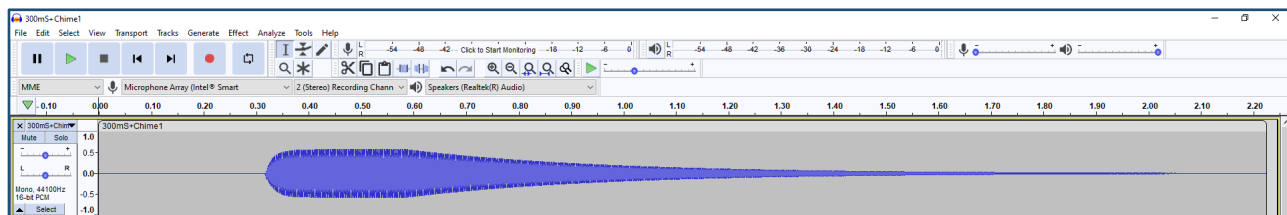
Audacity, add 300mS of silence (Check the audio format, 44.1kHz-16bit)

In the <Generate> menu you find an option <Silence>. Here you can select the required silence length. Then export the new massage as a .wave file, e.g. <300mS+Chime1>.

This new message, <300mS+Chime1>, has to be added to the message set and added to the configuration.

- Call macro to call to the remote system

This new message <300mS+Chime1> has to be used in the call macro <Call 1t chime>, used for the calls to the remote system.

Call macro <Call 1t chime>

This call macro can also be used for calls within the PRS system. The 300mS delay is hardly noticeable.

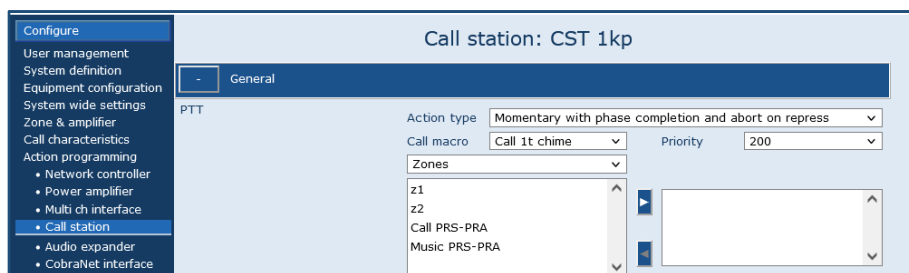- Call macro to receive a call from the remote system

A call from the remote system will enter PRS over a Dante channel so the source will be an Omneo channel.

The call macro <Call from PRA> will use the Omneo input <OMI_AI1>

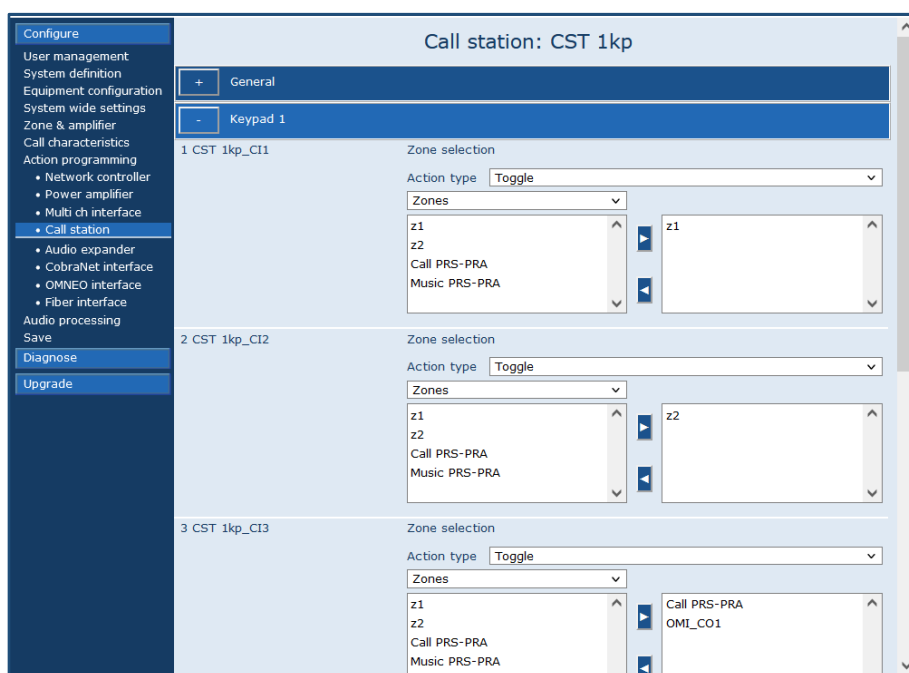

Call macro <Call from PRA>

- Action programming, CST

For the CST, the new call macro <Call 1t chime> has to be used.

Use the new call macro <Call 1t chime>

For the CST keypad the new zone <Call PRS-PRA> has to be added.

Also add a CI from the Omneo interface <OMI_CO1>. This CO will trigger the CI on the PRA system to start the call in the PRA system.

Assign the new zone <Call PRS-PRA> to a keypad button

- Action programming Omneo interface CI

A call from the remote system will start a call in the PRS system using a CI, <OMI_CI1>. We use the call macro <Call from PRA> for this call. The call will be routed to Z1 and Z2.
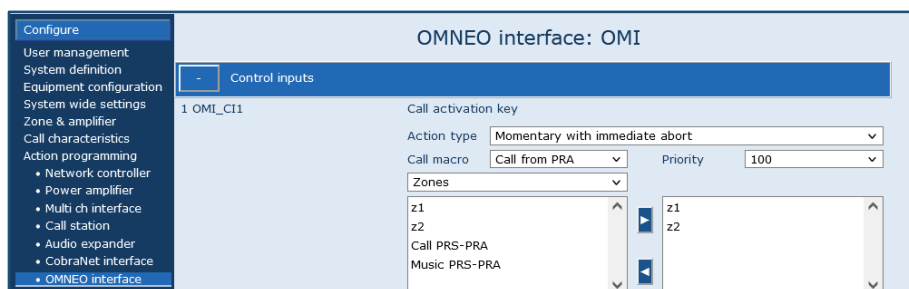
CI config <OMI_CI1>

Make sure to select <Momentary with immediate abort>.

PRAESENSA config

- Basic configuration

The basic system configuration of the PRAESIDEO system will not be described in the AN.

In the PRAESENSA system no additional hardware is required.

In the SCL we have to enable Virtual audio inputs and Virtual audio outputs. The inputs will receive the Dante channels from the PRS-4OMI4 of the PRS system, the outputs will send Dante channels to the PRS-4OMI4 of the PRS system.
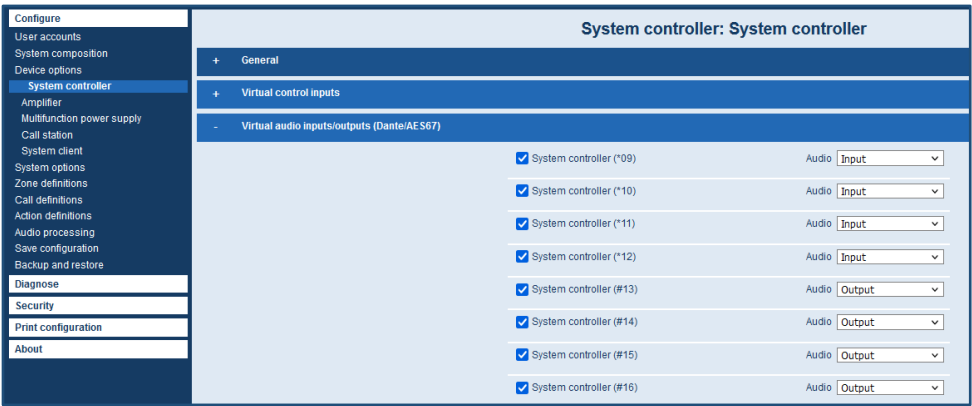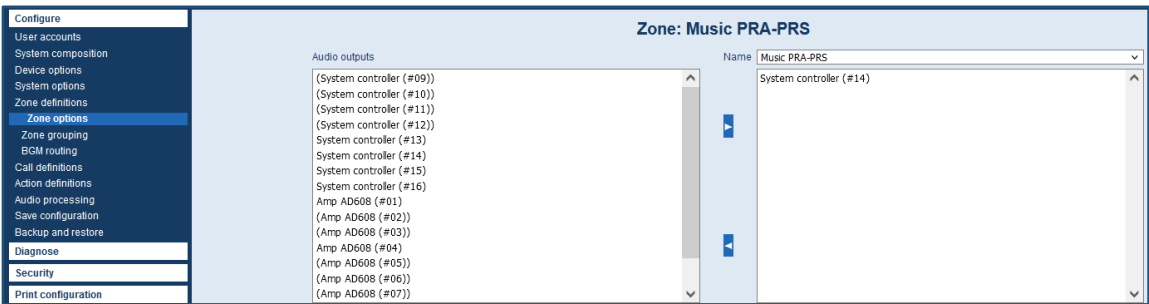

Enable Virtual audio inputs and Virtual audio outputs

- Zone configuration

To be able to transmit audio to the PRSsystem we need to create zones with Dante outputs. We will create 2 zones, 2 Dante output channels. For calls <Call PRA-PRS> and for BGM <Music PRA-PRS>.
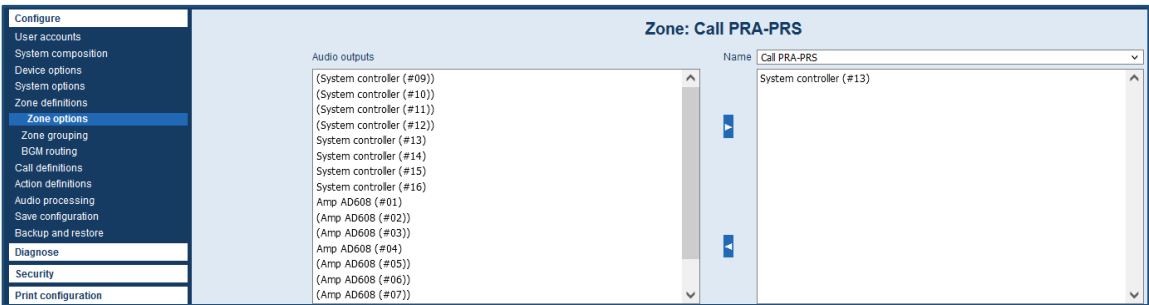
Zone: Call PRA-PRS

Zone: Music PRS-PRA

- BGM routing PRA-PRS

In the PRA system we will use the audio input on the CST as the source for BGM. This means we have to enable the audio input on the CST and use it as the source for the BGM channel.

Enable audio input on the CST

BGM is always routed to the PRS system so this zone, Music PRA-PRS, has to be added to the BGM channel.

Add <Music PRA-PRS> to the BGM channel

Now BGM is always routed to the PRS system.

- BGM routing PRS-PRA

We also want to receive and use BGM from the PRS system we need to create a new BGM channel. The BGM signal from PRS will enter PRA over a Dante channel so the source for this BGM channel will be a Dante channel on the SCL.

New BGM channel

No zones need to be added as we want to select the zones on a CST.

- Call definition and start tone

When a call is started from PRS to PRA or PRA to PRS there will always be a short delay in the response of the remote system.

If a call to a remote system is started, a CO has to be activated that activates the CI in the remote system that then starts the call in the remote system. This will result in a small delay of a few hundred milliseconds. The result of that delay will be that a few hundred milliseconds of the start tone will not be heard in the remote system but also that the start tone will start with an audible click.

To solve this it is necessary to add appr. 300mS silence before the start tone.

This means, for also for the PRA system, a start tone has to be used that starts with a short silence. We have to add 300mS silence before the actual chime.

Adding the 300mS silence can be done using Audacity. For a one tone chime it would look like the picture below.
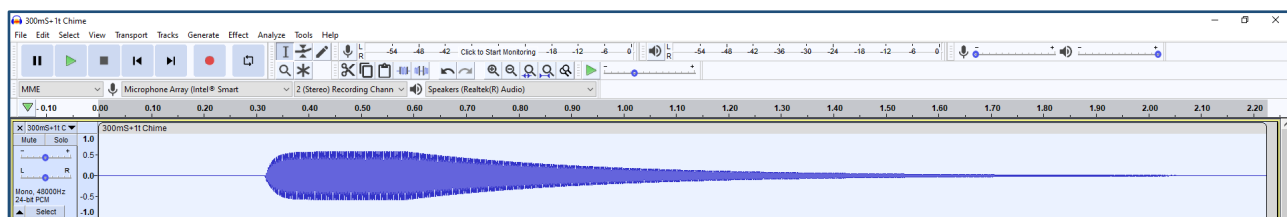
Audacity, add 300mS of silence (Check the audio format, 48kHz-24bit)

In the <Generate> menu you find an option <Silence>. Here you can select the required silence length. Then export the new massage as a .wave file, e.g. <300mS+Chime1>.

This new message, <300mS+Chime1>, can be uploaded to the SCL and used in the configuration.

- Call definitions

Call definition to call to the PRS system

This new message <300mS+Chime1> has to be used in the call definition <Call 1t chime>, used for the calls to the remote system.
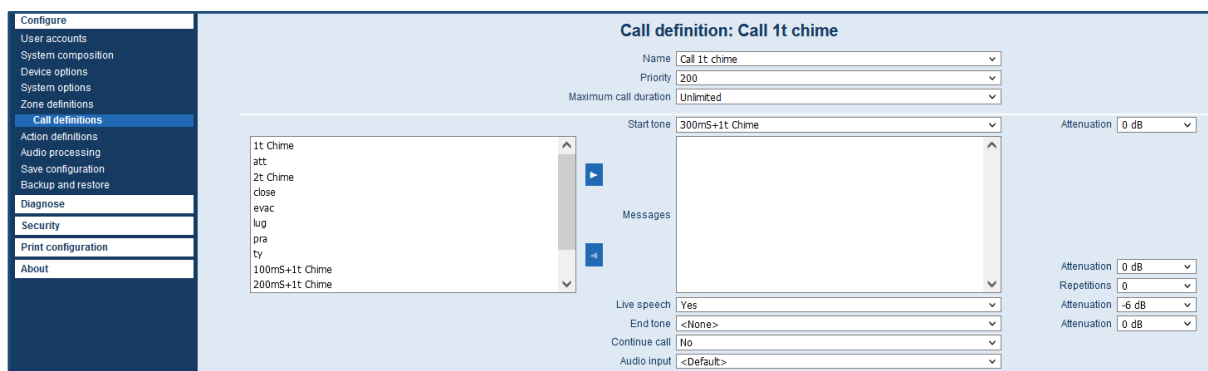
Call definition <Call 1t chime>

This call macro can also be used for calls within the PRS system. The 300mS delay is hardly audible.

Call definition to receive a call from the PRS system

A call from the PRS system will enter PRA over a Dante channel on the SCL.

The call definition <Call from PRS> will use the Dante channel <System controller *09>.

Call definition <Call from PRS>

- Action definition, CST

For the CST, the new call definition <Call 1t chime>, has to be used.

Action definition CST

For the CST extension the new zone <Call PRA-PRS> has to be added.

Add zone <Call PRA-PRS>

To be able to use a CO of the MPS3 to start a call in the PRS system, CO1 has to be assigned to a zone <Call PRA-PRS>.

Assign CO1 to zone <Call PRA-PRS>

Selecting priority range 32 to 255 will activate the CO during business and emergency calls.

CO1 will trigger the CI1 on the PRS system to start a call there.

- Action programming MPS3 CI *01

A call from the PRS system will start a call in the PRA system using a CI, <MPS3 CI *01>.

We use the call definition <Call from PRS> for this call. The call will be routed to Z1 and Z2 in the PRA system.

*Configure MPS3 <*01>*

Make sure to select <Momentary – abort on release>.

Routing Dante channels

To make the connection between the Dante channels from the PRS-4OMI4 and the Dante channels in the PRA-SCL we have to use Dante controller.

To be able to use Dante Controller the PC has to be connected to the PRAESENSA system network. This way we have access to the PRS-4OMI4 Dante configuration and the PRA configuration.

- Dante channel routing from PRAESIDEO PRS4OMI4 to PRAESENSA system controller

To route the PRS-4OMI4 Dante transmitter channels from the PRS system to the Dante receiver channels of the PRA-SCL we have to make the connection as shown below.
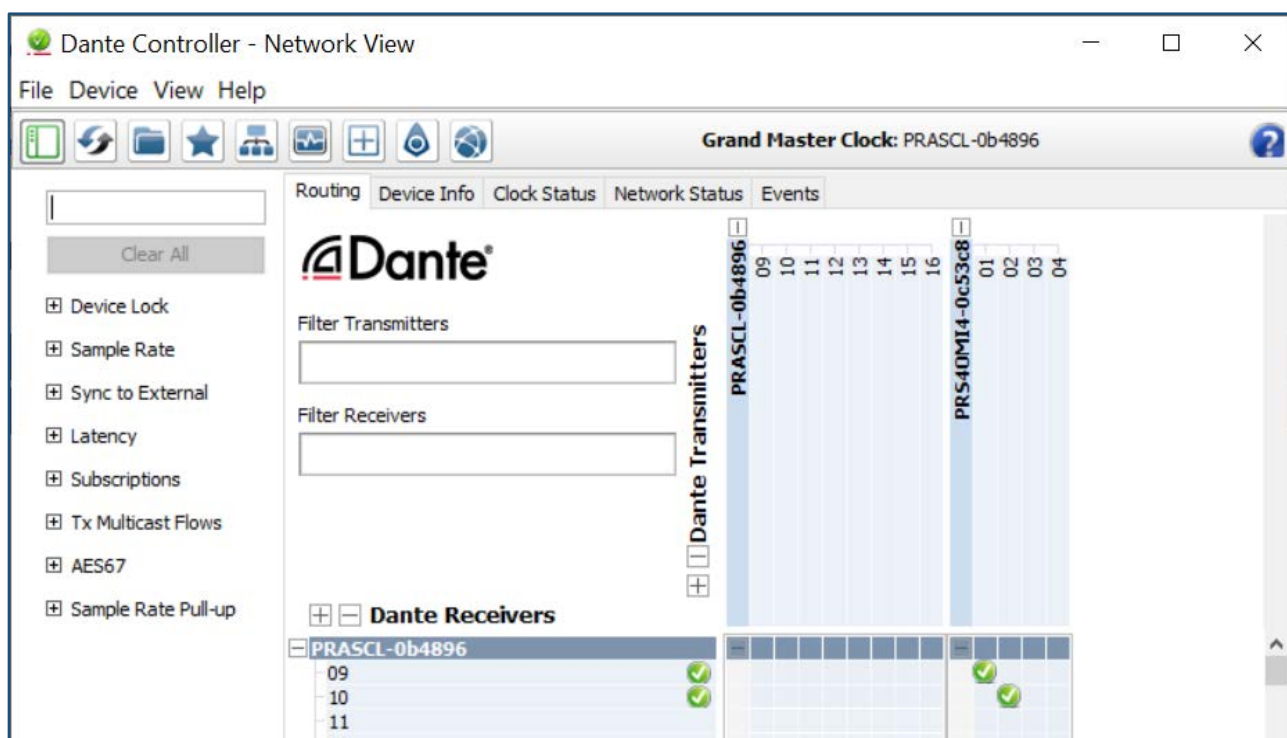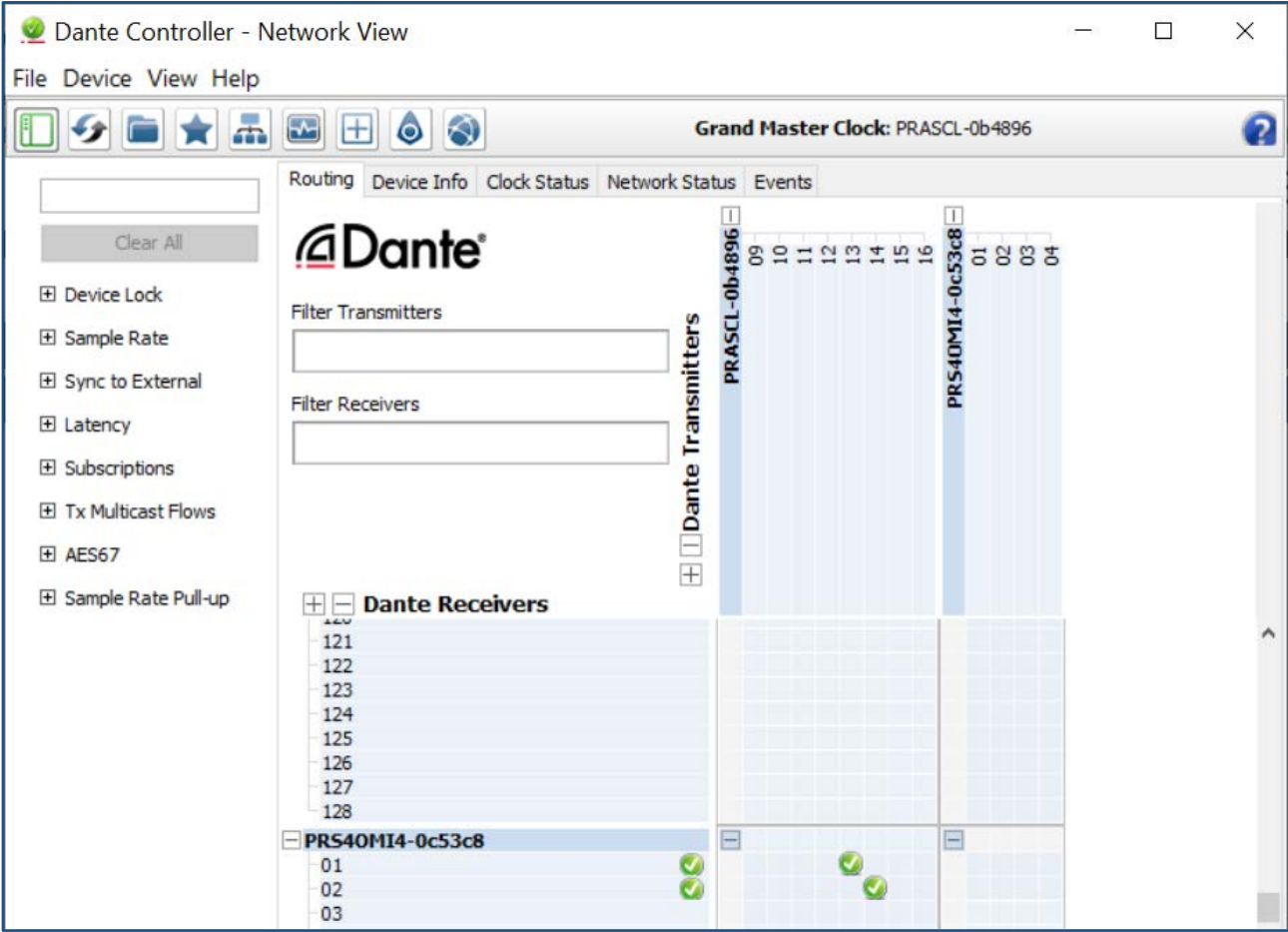

Dante channels routing PRS to PRA

Dante transmitter PRS-4OMI4 channel 1 and 2 are routed to Dante channels 9 and 10 of the PRA-SCL.

- Dante channel routing from PRAESENSA system controller to PRAESIDEO PRS-4OMI4

To route Dante transmitter channels of the PRA-SCL to the PRS-4OMI4 Dante receiver channels from the PRS system we have to make the connection as shown below.

Dante channels routing PRA to PRS

Dante transmitter channels 13 and 14 of the PRA-SCL are routed to PRS-4OMI4 channels 1 and 2 of the PRS-4OMI4 of the PRS system.

CI and CO over the Ethernet network

- Using PRS-1AIP1, IP audio interface, to transfer CI and CO over an Ethernet network.

When large distances have to be covered, using wired CI's and CO's is not practical. To transfer the CI's and CO's over the same network as the Dante audio channels can be a solution.

For this we can use the PRS-1AIP1, the IP audio interface.

The PRS-1AIP1 can transfer audio signals and CI's and CO's over an Ethernet network.

The audio channels of the PRS-1AIP1 will not be used because they introduce too much audio delay. We will only use the CI's and CO's of the PRS-1AIP1.

- PRS-1AIP1 in small system setups

On the PRS side the PRS-1AIP1 can be connected to the 2nd Ethernet port of the PRS-4OMI4.

On the PRA side the PRS-1AIP1 can be connected to a free Ethernet port of the PRA system.
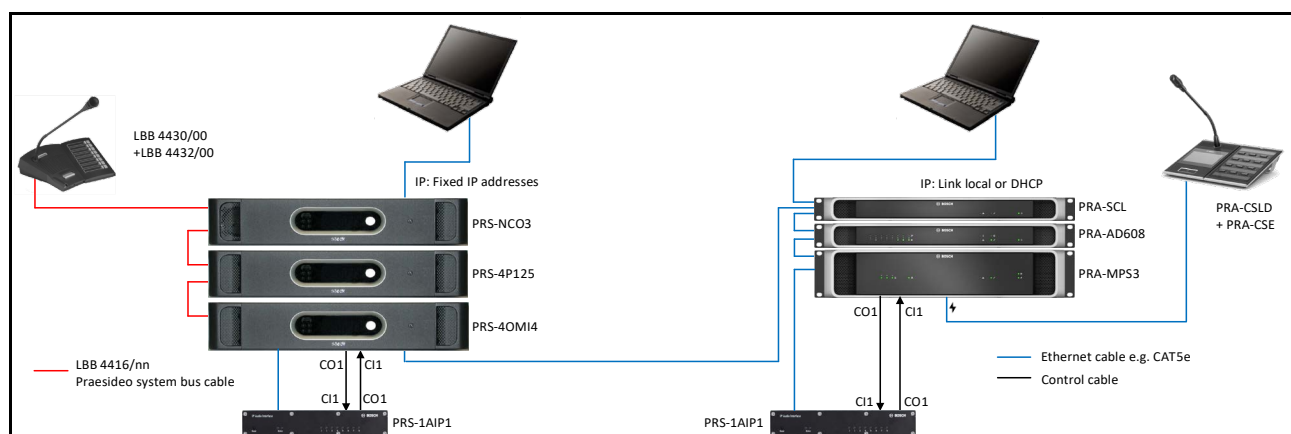
Diagram using the PRS-1AIP1 for CI and CO

Configuration of the PRS-1AIP1 is very straight forward and does not need explanation. Make sure that you select <Stream always> in both devices.

Using the PRS-1AIP1 to transfer the contacts over the network will introduce additional delay in the response of the remote system. On the PRS-1AIP1 a CI has to be triggered that will activate a CO of the PRS-1AIP1 on the remote location. This will give an additional, short, delay on top of the delay we already had using the CO's and CI's in the PRS and PRA system.

Therefore the 300mS silence before the start of the chime has to be increased to appr. 500mS.

Important: For smaller system setups this might be a solution, few CST and a few BGM channels. The moment the number of CST, the number of calls, and the number of BGM channels increase, this solution will not work due to the large amount of multicast channels on the network. The IP audio interface cannot handle many multicast channels at the same time and, because of that, the unit can stop working. Tests have shown that the PRS-1AIP1 can handle up to 8 multicast channels. This means BGM channels (which are always active) plus call channels (which are only active during a call).

- PRS-1AIP1 in large system setups

In large systems with many CST's and many BGM channels, the number of multicast channels cannot be handled by the PRS-1AIP1 and the Dante audio channels have to be separated from the PRS-1AIP1 data.
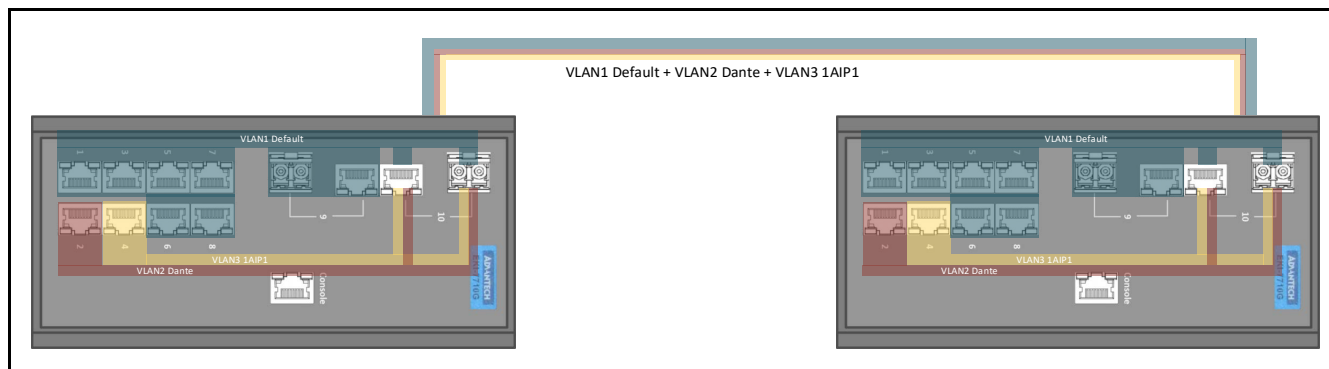
To separate Dante audio channels and PRS-1AIP1 data we have to create VLANs on the network. To be able to create VLANs, additional network switches are required e.g. the PRA-ES8P2S.
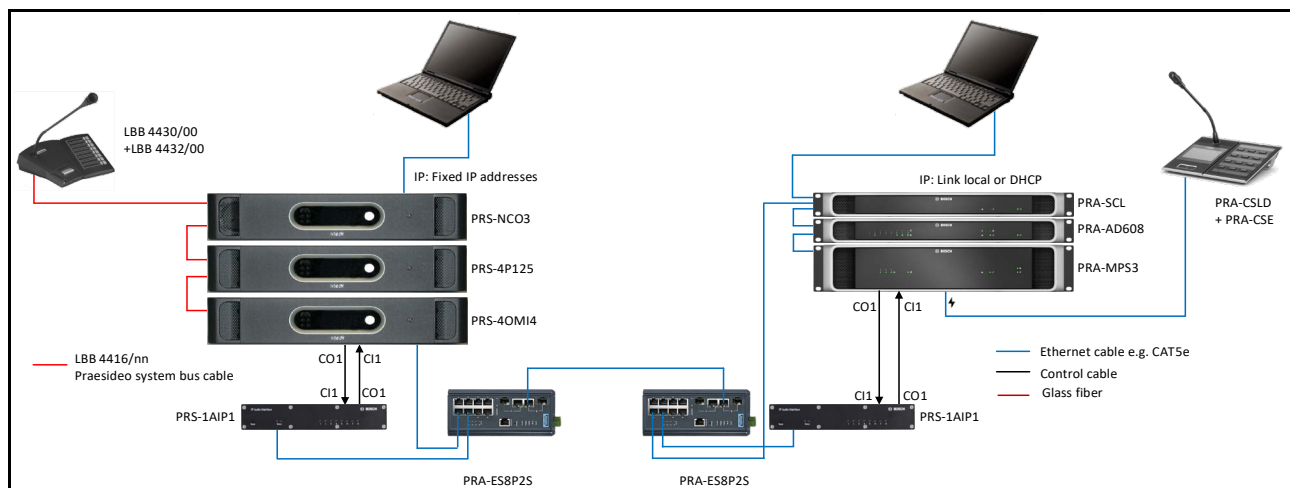
Block diagram using 2x PRA-ES8P2 to create VLANs between PRS and PRA

In the PRA-ES8P2S network switch VLANs can be created
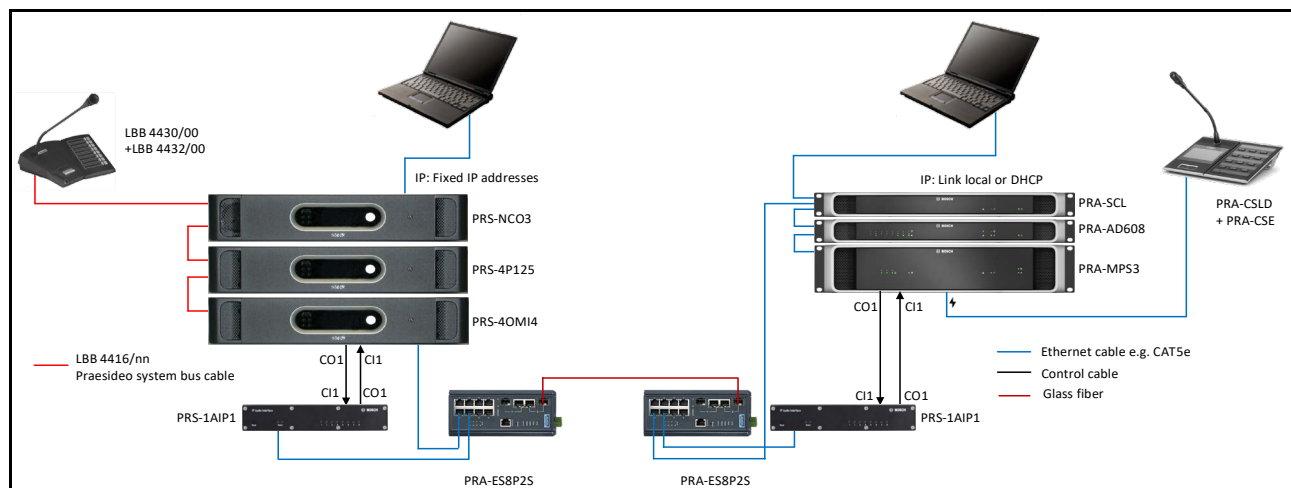
- VLAN configuration

VLAN configuration to separate Dante audio channels and PRS-1AIP1 data

Check the AN "PRA-ES8P2S VLAN configuration" for a full description of the switch configuration.

Covering larger distances

If large distances have to be covered between the PRS and PRA system we can use glass fibers for the connection between the PRA-ES8P2S switches.

The overall block diagram will be similar to the previous block diagram but now glass fibers are added, replacing the wired Ethernet connection. Also additional PRA-SFPnX, fiber transceivers, have to be added to the switch.

Block diagram to cover large distances using PRA-ES8P2S and PRA-SFPnX

The VLAN configuration from the previous block diagram can also be used here.

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