

9402A

Operating Manual
Genelec 9402A
System Management Device
for Dante to AES/EBU

GENELEC®

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Genelec 9402A System Management Device for Dante to AES/EBU



Introduction

Congratulations and thank you for purchasing the Genelec 9402A System Management Device interfacing Dante audio streams to AES/EBU. This manual addresses the setup and use of the Genelec 9402A.

The Genelec 9402A is designed to bring high-quality multichannel audio into monitoring systems via Dante and other standard audio-over-IP (AoIP) networks, enabling seamless integration into modern IP-based audio environments. It allows Smart Active Monitoring (SAM) monitors to receive and reproduce multichannel audio directly from networked audio sources with precision, flexibility, and low latency.

The 9402A provides 16 channels of AES/EBU digital audio feeds for SAM monitors, making it an ideal hub for immersive and multichannel monitoring systems. In addition, it includes an auxiliary AES/EBU output to support monitoring applications such as headphones.

For systems requiring extended low-frequency performance and bass management, the 9402A also features a dedicated AES/EBU interface for 7300 Series Smart Active Monitoring (SAM) subwoofers, enabling optimized low-frequency reproduction and system alignment.

The 9402A enables the monitoring of immersive digital audio, supporting monitoring layouts up to 9.1.6 configuration when the low frequency effects (LFE) channel is also used.

The auxiliary AES/EBU output can be used to connect, for example, an additional stereo

monitor system or headphones when a digital-to-analog interface device and a headphone amplifier is used.

Genelec's energy-saving Intelligent Signal Sensing (ISS) function automatically puts the 9402A into a power-save state when no AoIP stream is present. The waiting time before activation can be configured using Genelec Loudspeaker Manager (GLM) software. When ISS mode is activated on your monitoring system, it will remain ready for action and consumes less than 4.5 Watts of power. The interface will wake up and switch to normal operating mode when it senses an AoIP stream.

This 9402A is supplied with:

- Mains cable
- 5 m GLM network cable
- Operating manual
- Quick setup guide

The 9402A uses in addition a standard CAT cable for the IP network connection.

Installation

We strongly recommend switching off/disconnecting mains power from all system devices before connecting signal cables.

Connections

Pay attention to the GLM network and Ethernet connectors. The GLM network uses the 8P8C (RJ45) connector but is not compatible with Ethernet or Power over Ethernet (PoE).

The mains input supports a wide voltage range (100-240 VAC, 50-60 Hz). If the mains power is provided by a generator, inverter or a

low-quality UPS device, we recommend using a harmonic filter to reduce the unwanted harmonic distortion.

The two digital audio stream inputs for ST2110, AES67 or Dante digital audio stream uses a standard 1000BASE-T compatible network interface with an RJ45 connector. The two inputs offer redundancy and can be configured for fast and seamless hand-over in case of the failure in the primary stream input.

When the audio content in the stream carries a low frequency effects (LFE) channel, the 9402A is configured to extract the correct channel as the LFE content and assign the LFE content to the AES/EBU output and subframe by using the GLM software.

The multichannel audio output for the monitors uses one DB25 connector to deliver 8 AES/EBU audio signals, carrying 16 channels of audio. The output is a bit-to-bit copy of the stream content audio signals, so the outputs retain the original signal quality without modification. When used, the LFE signal is output using the subwoofer output (XLR male) and is also available through the DB25 connector, meaning that the LFE content is available for any device connected to this output. The assignment of the multichannel audio output channels is done using the Dante software (Dante Controller, Dante Domain Manager, or Dante Director).

The Subwoofer Link is a digital audio output for the subwoofer. It is a single male XLR connector which uses an AES/EBU cable to carry the sum of all the main channel inputs over AES/EBU subframe A and the LFE channel

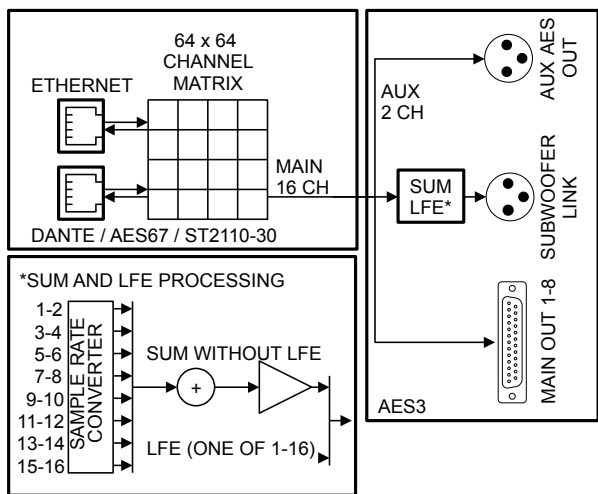


Figure 1. Functional block diagram of the 9402A and the sample rate converter (SRC)

(if used) over AES/EBU subframe B. A GLM Kit or 9320A Reference Controller and Genelec Loudspeaker Manager (GLM) software is required to use the 9402A with SAM monitor loudspeakers and subwoofers. The AES/EBU output on 7300 Series subwoofers enables the daisy-chaining of additional SAM subwoofers to increase the capacity of the system's low frequency acoustic output (SPL). To make this possible, GLM software will align the playback of the complete subwoofer system with the rest of the monitoring system. The 9402A includes two GLM Network connectors for management using Genelec Loudspeaker Manager (GLM) software.

The AUX Stereo Output is a single XLR connector, which delivers two channels of audio. The audio content can be defined using the GLM software.

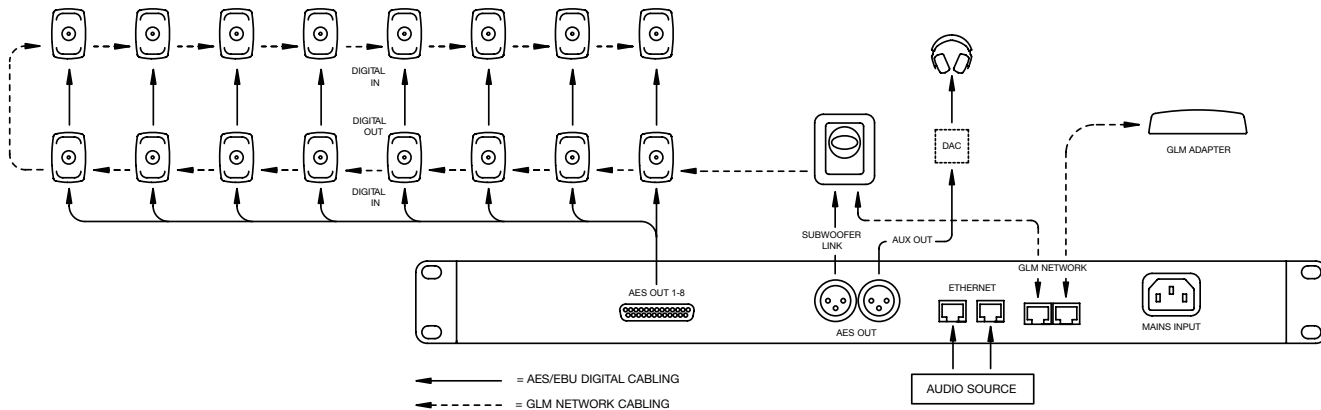


Figure 2. An example monitoring system connected with the 9402A

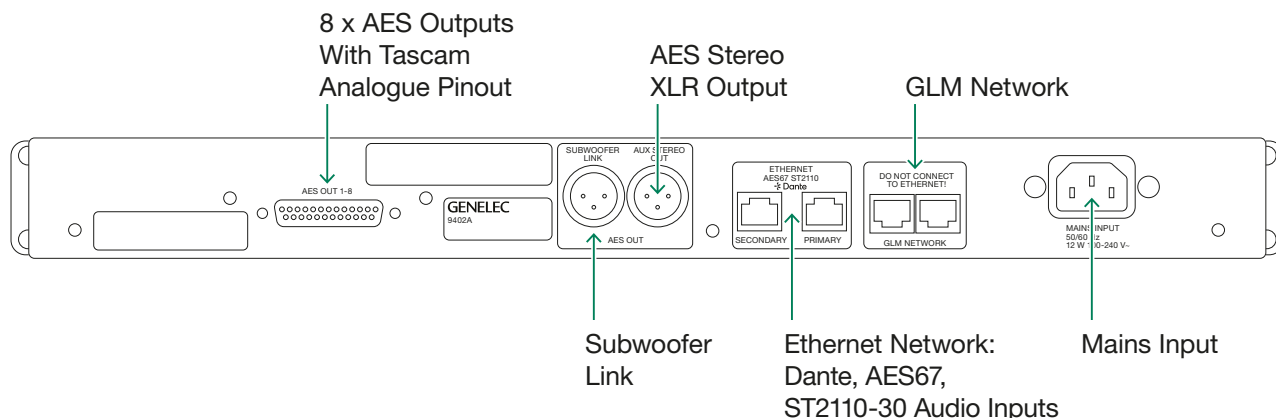


Figure 3. Connectors on the back panel of the 9402A

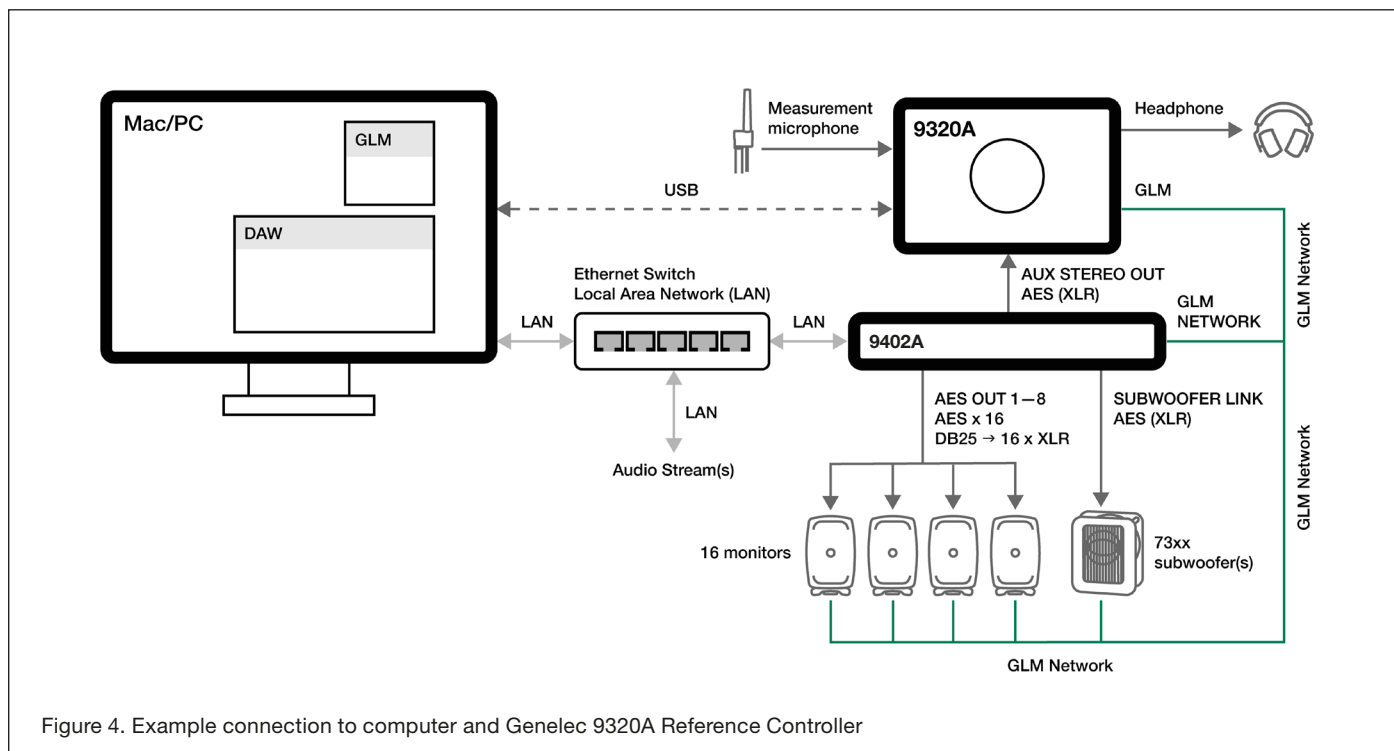


Figure 4. Example connection to computer and Genelec 9320A Reference Controller

Redundant IP Network Input

The 9402A offers two Ethernet network connections. This enables redundant Ethernet network connectivity following the ST2022-7 specification. The 9402A can be connected to two separate Ethernet networks, so that audio streaming is seamlessly switched over if the primary Ethernet network is compromised.

The primary network interface is self-configuring by default. This means that the 9402A will automatically assign an IP address to itself without DHCP or DNS servers. The assigned IP address is visible in GLM. The 9402A will advertise its services on the Ethernet network and be discoverable through Dante Controller, Dante Domain Manager or Dante Director software.

The secondary Ethernet network interface is set in switched mode by default. IP Packets entering the primary port will be forwarded to the secondary port, allowing a second Ethernet device to be connected without using a separate IP network switch device. Both network interfaces support zero-configuration, DHCP and static IP operation.

The Ethernet interfaces of the 9402A follow the 1000Base-T standard for Gigabit Ethernet. Slower transmission speeds (10Base-T, 100Base-T) are not supported. Use of CAT 5e cabling or better is necessary.

Selection of IP switch

The 9402A is fully compatible with standard Gigabit Ethernet and IP switch technology. Genelec recommends using a managed switch. Managed IP switches offer the ability to configure, manage and monitor the local area network, typically using a web browser user interface, and this helps in creating a well working system.

The IP switches should support QoS and multicast groups. Differentiated services (DiffServ) typically implement QoS prioritization of IP traffic. DiffServ marks IP packets according to priority. In response, IP switches can prioritize media traffic to improve system performance. Differentiated services code point (DSCP) markings in the IP packet headers are sensed by the QoS capable IP switch. Multicast groups can be used to reduce traffic in large networks by forwarding data only to the devices that are set to receive it. Genelec does not endorse certain IP switch brands as the 9402A works perfectly with all high-quality standard IP switches with these capabilities. Use of 1 Gbps (Gigabit) or faster IP switches is mandatory.

Network Structure

For redundant connectivity, Genelec recommends a spine-leaf IP network architecture. Otherwise, a star architecture is recommended. IP device ports should not be

daisy chained to several IP devices. Each IP switch must have its own IP address.

The 9402A can act as an IEEE1588-2008 compliant clock source for the ST2110, AES67 or Dante network using the Precision Time Protocol version 2 (PTPv2). The PTP on 9402A is fully configurable through the Dante configuration software.

Audio-over-IP requires the use of a cable-based LAN network. Low-latency uncompressed audio-over-IP streaming is not feasible over WLAN.

Output Cabling

The AES59 standard offers a configuration to deliver 16 channels of digital audio in one direction. This configuration is used in the output DB25 connector of 9402A. The audio output in 9402A is intended for connections to monitors. The recommended cable for this connection is an 8 x XLR male fan-out cable following the AES59 pinout, also known as the Tascam analogue pinout. For example, an Avid cable type DB25-XLRM DigiSnake can be used. In addition, AES/EBU XLR-to-XLR cables are needed to extend the signals from the snake output onwards to the monitors.

The AES59 standard output connector pinout of the 9402A is shown in Figure 5. We strongly recommend that a high-quality AES/EBU digital audio cable be used.

Indicator	Colour, indication	Meaning
Power switch	Solid green	Power on, normal operation
	Blinking green	GLM is adjusting 9402A
	Green blink every 10 s	9402A in power save mode
	No light	No power, power off
Signal indicator	Solid green	9402A output transmitter is active

Table 2. Front panel indicator light functions

Controls and Indicators

The audio output connectivity of 9402A's front panel features a power switch with a power-on light as well as nine active connection indicator lights for the AES/EBU outputs.

The 9402A is configured using Genelec Loudspeaker Manager (GLM™) software. Please refer to the 'Configuration' section below for details. While editing the 9402A settings in GLM, the interface's power-on light will blink continuously. A lit light indicates that the corresponding AES/EBU is available for output. See Table 2 for a list of indicator lights and their functions.

Configuration and Management Using GLM and Dante Software

The 9402A is set up using Genelec Loudspeaker Manager GLM™ software, using GLM's Management Network. Advanced setup is done via Dante Controller or Dante Domain Manager software. The IP address of the 9402A can be found in GLM settings for the 9402A. More information about GLM is available in the SAM System Operating Manual.

Connection

Configuration consists of the following steps:

- Connect the IP network to the primary Ethernet network interface.
- Set up a digital audio stream in the ST2110, AES67 or Dante formats.
- Configure the audio source to connect to the 9402A device, using Dante Controller or Dante Domain Manager software.
- Connect 'AES OUT 1-8' to a fan-out cable and continue with XLR-to-XLR cables to each monitor. Please use cables intended for carrying AES/EBU digital audio. We strongly discourage the use of standard analogue microphone cables as this may reduce system performance.
- Connect the 'SUBWOOFER LINK' output to the 'DIGITAL IN' connector on a Genelec 7300 Series subwoofer.

- Connect the 'AUX STEREO OUT' output to stereo monitors or headphones through a digital-to-analog converter and a headphone amplifier.
- Connect CAT 5 (RJ45) GLM network cables between the 9402A, every monitor and subwoofer. Finally, connect to the GLM Adapter device (see Figure 2). The connection order of the other devices is not important. Connect the GLM Adapter device to your computer via USB.
- Install and run Genelec Loudspeaker Manager (GLM) software.

All devices appear in GLM software monitor stack. Move devices from the monitor stack onto GLM's honeycomb grid, including the 9402A. You may want to drag and drop the 9402A icon close to the subwoofer connected to it (see Figure 6).

When using multiple 9402A devices, you can identify a 9402A by clicking the 9402A icon in GLM, causing the associated 9402A device front panel power button light to blink.

Configuration

Configuration of the 9402A using GLM software has the following steps:

- Select the 'Input Mode' for the monitor Group to 'Digital'. Then, click on the 9402A icon(s) in the grid and set the group status to 'ON' for the 9402A device(s) to become active.
- Select the AES/EBU Digital Channels in the 9402A menu to enable them on the 'Subwoofer Link' output. **Note that you need to configure the audio streams. (see section Setting Up Audio Streams)**
- Select the 'Used with 9402A' option in the 7300 series subwoofer settings.
- In the 'LFE Channel' drop-down, select the AES output and the subframe that carries the LFE channel audio.

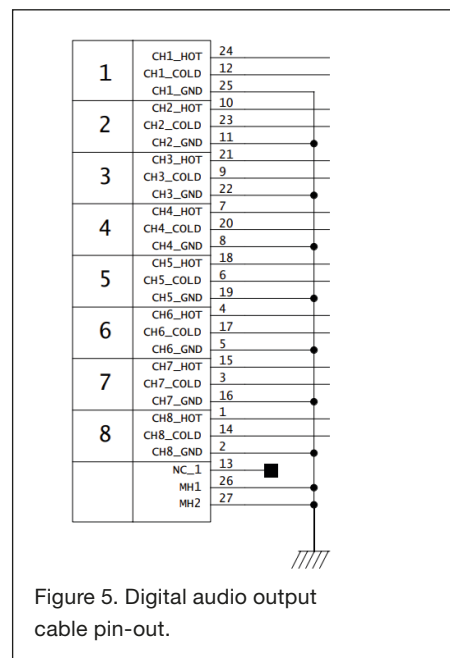


Figure 5. Digital audio output cable pin-out.

- Click on the subwoofer icon(s) to apply the '+10 dB' setting in the subwoofer configuration, in case the LFE channel requires a +10 dB boost compared to the main audio channels.

When all 9402A units in the system are set to 'Group Off' state, the 7300 series subwoofers switch the AES/EBU digital stereo audio input to a standard stereo audio input.

Setting Up Audio Streams

Audio stream setup is done using Dante Controller software. Download the software from <https://www.audinate.com/products/software/dante-controller>

An AES67 audio stream supported by the 9402A device can have the maximum of 8 audio channels. Two AES67 streams are required for 16 channel output. Dante automatically divides a multichannel stream into several low channel count flows and this process is largely automatic.

The AES67 compatibility mode must be turned ON to enable reception of AES67 streams. Follow these instructions:

- Double click on 9402A to be configured. The Device View window opens.
- Click AES67 Config -tab.
- In the AES67 Mode panel, go to New: and select Enabled.
- In the Reset Device panel, click Reboot to reboot 9402A with AES67 enabled.

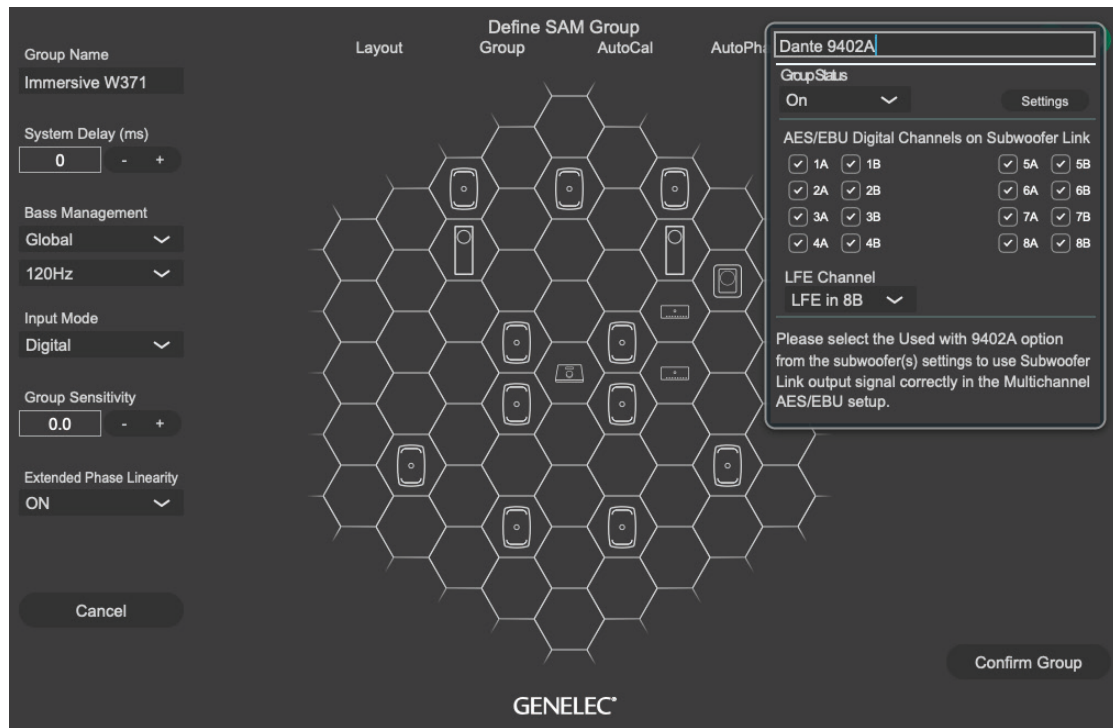


Figure 6. 9402A setup panel in GLM software

Acoustic Calibration

GLM software supports automatic calibration and system alignment of the complete monitoring system.

To acoustically calibrate your setup, attach the measurement microphone included with your 9320A Reference Controller or GLM Kit onto a microphone stand so that the microphone points upwards, then place the microphone at the listening position with the microphone top positioned at the listener's ear height.

Follow the steps in the GLM software to calibrate your entire system. The calibration process starts after you create a new group preset using 'File' | 'New' menu item. An existing group preset can be calibrated by selecting the 'Group Preset' | 'Calibrate' menu item.

If you wish to disconnect the computer after calibration, save the GLM calibration onto the monitors, subwoofers and 9402A interfaces in your system. The settings can be stored using the GLM software menu item 'Store' | 'Store the Current Group Settings'. Note that monitors and subwoofers might have a switch that enables "stored settings". This switch must be set to 'ON' for operating the system with the stored settings. After removing the GLM

network cable and powering the 9402A and all monitors off and on, the stored settings are enabled. We strongly recommend using GLM software and keeping the GLM network connected to access the full flexibility of the monitoring system.

Returning to Factory Settings

GLM settings stored in a 9402A can be erased by keeping the power switch depressed for more than 10 seconds before releasing it again. This returns the 9402A to its factory settings. After this, GLM software should be used to reconfigure the 9402A.

Troubleshooting

If there are issues with audio transmission such as cuts or latency peaks, please check the following common issues. For additional information on how to perform each step, consult the manufacturer documentation or a technician.

- Processor usage of the computer used as the audio-over-IP audio source device. If the usage is at over 75 %, there is a risk of cuts in audio transmission. Attempt closing unnecessary background programs.

- Power saving settings of the processor or the Ethernet adapter. Attempt disabling these settings or setting the computer to high performance mode. If using a laptop, avoid using battery power and run on mains power instead.
- Antivirus and firewall settings. Make sure that the antivirus is not interfering with the audio streaming programs, and that the necessary firewall rules are set.
- Buffer length of the transmitter or receiver. Attempt increasing the buffer length or setting additional safety playout delay in the web interface general settings. If using different Ethernet adapter models in ST2022-7 mode, increasing the buffer size might be necessary to avoid cuts between switching.
- Other Ethernet or wireless adapters (Bluetooth, Wi-Fi). If these are active at the same time with the Ethernet adapter used for audio transmission, latency peaks may occur. Attempt disabling all other network and wireless adapters. An active internet connection on the streaming Ethernet interface may also cause latency peaks.

Compliance to FCC Rules

This device complies with part 15 of the FCC Rules. Operation is subject to both of the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- Modifications not expressly approved by the manufacturer can void the user's authority to operate the equipment under FCC rules.

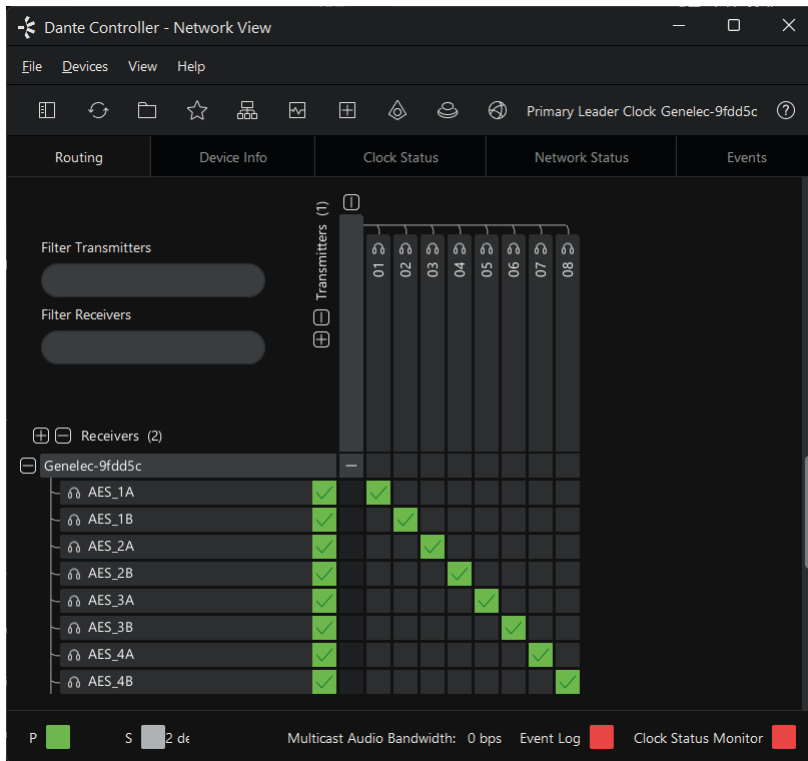


Figure 7. Audio stream setup matrix

- If using an external Ethernet adapter, it is recommended to use Thunderbolt instead of USB for optimum performance.
- For the lowest latency, a network adapter with hardware PTP timestamping support should be used.

Operating Environment

The 9402A is designed for indoor use only, and the permissible ambient room temperature is 15-35 degrees Celsius (59-95°F) with a relative humidity of 20% to 80% (noncondensing). If the 9402A has been stored or transported in a cool environment before entering a warm room, please wait between 60 minutes before unpacking it, as this will prevent harmful condensation. Sufficient cooling must be ensured to keep the 9402A within optimal operating temperatures. No minimum clearance for ventilation is needed around the interface.

Maintenance

There are no user serviceable parts inside the 9402A. Maintenance or repair must only be performed by Genelec certified service personnel.

Guarantee

Genelec guarantees the 9402A for two years against manufacturing faults or defects that alter performance. Refer to the reseller for full sales and guarantee terms.

Safety Considerations

The 9402A has been designed in accordance with international safety standards. To ensure safe operation, the following warnings and precautions must be observed:

- Servicing and adjustment must only be performed by Genelec certified service personnel.
- The enclosure must not be opened.
- Do not use this product with a mains cable or mains outlet without a protective earth (potential-equalising) connection, as doing so may result in personal injury.
- To prevent fire or electric shock, never expose the unit to water or moisture.
- Do not place objects filled with liquid, such as vases, on or near the 9402A.
- The 9402A is never completely disconnected from mains power unless the mains cable is removed from the device or the mains outlet.

Genelec 9402A System Management Device for Dante to AES/EBU

SPECIFICATIONS	
Description	Feature
Network interface	RJ-45 connector for 1000BASE-T
Network cable	Category 5e (Cat 5e) or higher-rated Ethernet cable
Number of Ethernet ports	2
Digital audio input format	ST2110-30, AES67, Dante
Digital audio input specifications	ST2022-7
Digital audio word length	Minimum 16 bits, maximum 32 bits. AES/EBU outputs maximum 24 bits
Digital audio sample rate	Minimum 44.1 kHz, maximum 192 kHz (96 kHz in AES67/ST2110 mode). Supports single-wire AES/EBU audio, does not support dual wire AES/ EBU audio
Packet time in AES67 mode	125 usec, 250 usec, 333 usec, 1 msec
ST2110-30 Conformance level	A, B, AX, BX
Digital audio output format	AES/EBU (AES3-2003) Can also be used with S/P-DIF and AES3id signals when impedance converters are used
Digital audio output impedance	110 ohm differential
Digital audio output level	2.5 Vpp
Maximum AES/EBU cable length	100 m
Minimum latency	0.25 ms
End-to-end latency	< 3 ms (dependent on buffer size)
Clock synchronization	Sample accurate
Conversion accuracy	Bit perfect
Operating temperature	15-35 C (59-95 F)
Weight	2 kg (4.4 lbs)
Dimensions Height: Width: Depth:	43 mm (1 11/16 in) 483 mm (19 in) 105 mm (4 1/8 in)
Mains input voltage	100...240 VAC (50...60 Hz)
Mains tolerance	+/- 10 %
Operating power consumption	12 W
Idle power consumption	9 W
ISS state power consumption	4.5 W
Power off consumption	< 1 W
Operating environment humidity	10-80 % non-condensing
EMC compliance	FCC part 15 Class B, CE