AEQ

NETBOX 32 AD MX

Dante™ and AES 67-compatible AoIP router with mixing capabilities

Audio inputs and outputs analogue, digital and through AoIP network

EQUIPMENT DESCRIPTION

64 X 64 circuits audio mixing and distributing matrix. Perfect for small and medium-sized installations.

NETBOX 32 AD MX is able to route any of its 16 analogue, 16 digital and 32 audio-over-IP inputs on any of its 64 outputs (including 16 analogue, 16 digital and 32 AoIP).

As a summing matrix, it can also mix combinations of its 16 analogue, 16 digital and 32 audio over IP inputs, each one with independent level, to each of its 64 outputs (16 analogue, 16 digital and 32 AoIP), according to the configuration established in Netbox RTC at a given time.

NETBOX 32 AD MX also incorporates 16 GPI and 16 GPO (each GPIO connector includes a power supply pin in order to feed external circuitry). GPIO can also be transported through the IP network between compatible devices. This way, a GPI can drive the GPOs in

different piece of equipment.

Its front panel provides three-color level indicator for each of its analogue and digital inputs and outputs.

It can also generate a test tone that can be applied to any output, and sends audio presence indicators to the operation software for every input and output, as well as precision vu-meters for the AoIP ones.

It can be used in combination with any AEQ or third-party device from more than 350 manufacturers which are compatible with Dante AoIP protocol, and many others compliant with AES67 standard: it can subscribe to any of the audio flows existing in the network using its 32 AoIP inputs, while publishing its 32 outputs so they can be received by other devices.

MAIN FEATURES

- ✔ Logic lines grouping into stereo pairs.
- ✔ Input and output level adjustment.
- ✔ Signal mixing to any output on demand, with no limitations.
- ✔ Customized view and work scenarios configuration.
- ✔ Macro, salvo and configuration views management.
- ✔ Task scheduling, executed by clock, alarm or external triggering.
- ✔ Talkback or Multiplex, N-1 based, group creation.
- ✔ Multi-device and multi-user control.
- ✔ Access rights management for each functional user group.
- ✔ Critical lines protection.
- ✔ Physical and virtual GPIO management between different devices.
- ✔ AGC (automatic gain control) on AoIP inputs and outputs.
- ✔ Flexible vu-meters and test-tone generation.
- ✔ Dante / AES67 AoIP connectivity.
- **16** Analogue inputs, groupable into stereo pairs.
- **8** Stereo or dual AES3 digital inputs.
- **32** AES67 / Dante AoIP inputs.
- **16** Analogue outputs, groupable into stereo pairs.
- **8** Stereo or dual AES3 digital outputs.
- **32** AES67 / Dante AoIP outputs.
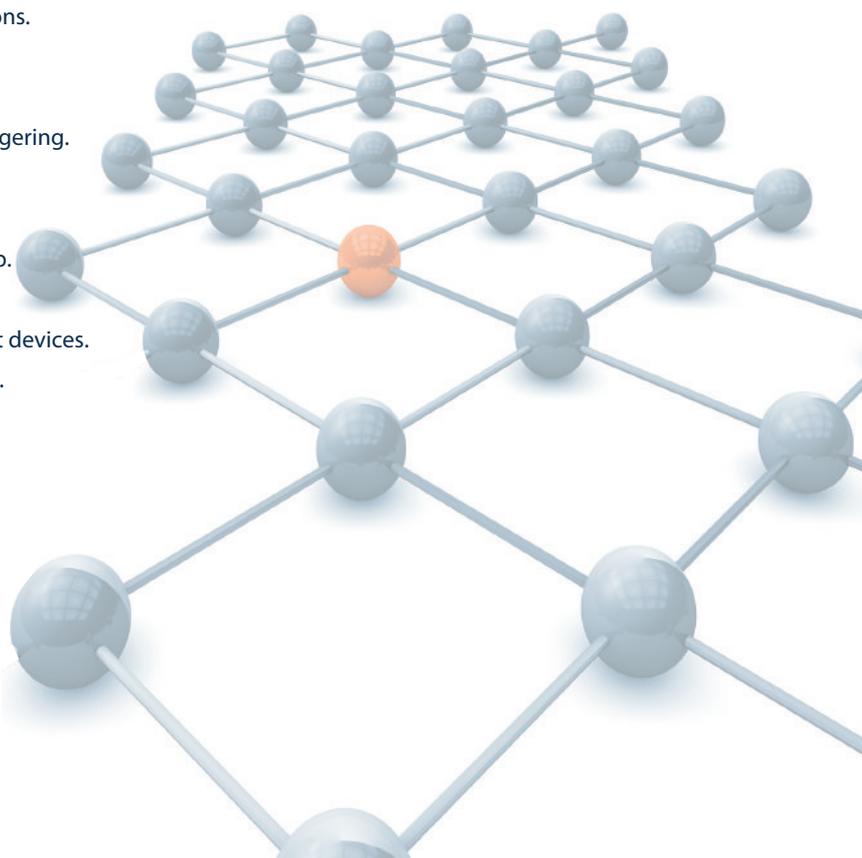
Front panel
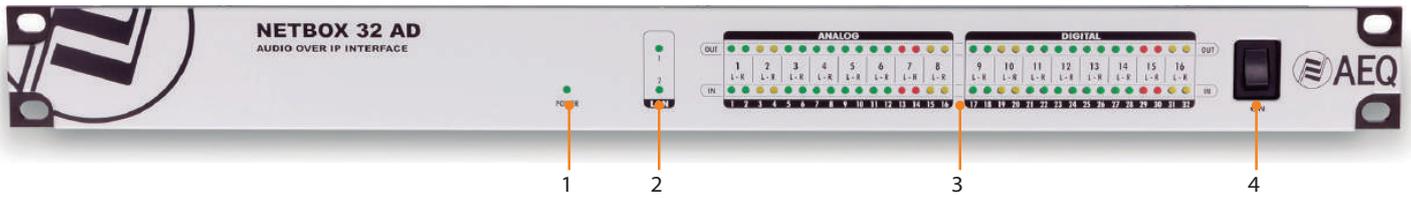
1 Power-ON LED. Indicates the device's power supply status.
2 LAN LEDs. Indicate the status connection of the audio over the following local area network ports: LAN 1 (main interface) and LAN 2 (secondary interface).
3 Audio level LEDs. Each LED indicates the level of each device's analogue or digital input or output channels.
4 Power switch located in its front panel.

Rear Panel Connectivity
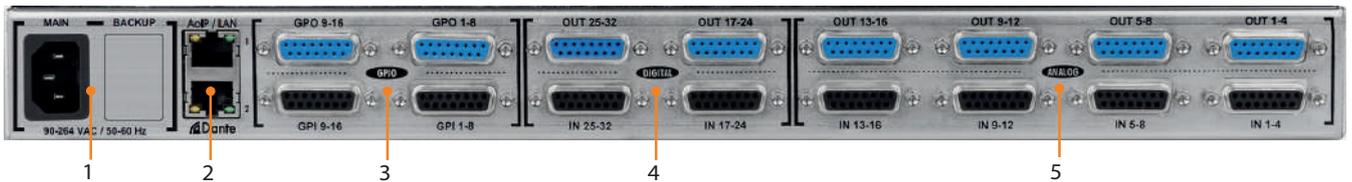
1 Power input: Netbox 32 features a universal-input internal power supply (with optional redundancy).
2 Ethernet ports (LAN 1 and LAN 2). NETBOX AD MX features two Ethernet ports: LAN 1 must always be wired, while LAN2 is to be connected only when the system is configured in "Daisy Chain" mode or a redundant system is set up.
3 GPIO connectors (DB15). NETBOX AD MX includes two of these connectors including 8 GPI each, and another two with 8 GPO each. All the connectors have a common ground and provide a 5V. reference signal. Thanks to the open protocol implemented, operation with third-party devices is possible, allowing GPI and GPO transportation between devices using the IP network.
4 AES-3 / SPDIF digital inputs and outputs, also using female DB15 connectors. 4 dual circuits per connector, 2 input + 2 output connectors.
5 Analogue inputs and outputs use female DB15 as well: 4 circuits per port. 4 input + 4 output ports.

Comments on Netbox 32 AD MX Wiring
AEQ simplifies installation by simplifying the wiring between the system and connected devices, as the following accessories can be provided on demand:

- DB15M AU. Connection cable for 4 inputs or outputs. Male DB15 connector connected to a 6-meter long wire bundle with 4 balanced and screened cables which are open in the opposite end.

- DB15M GPIO. It consists on a DB15 male connector soldered to a 15-way, 6-meter long cable, which no connectors in the other end, for GPI and GPO usage. Each cable allows for the connection of the 8 GPI or 8 GPO provided in each device's connector.

The **NETBOX 32 AD MX router** and the **NETBOX 32 AD interface** shares same hardware, however **AD MX router** incorporates outstanding performance derived from programming internal firmware, and **Netbox RTC application**.

The Netbox 32 AD interfaces are transform into NETBOX 32 routers AD MX purchasing and installing your router license.
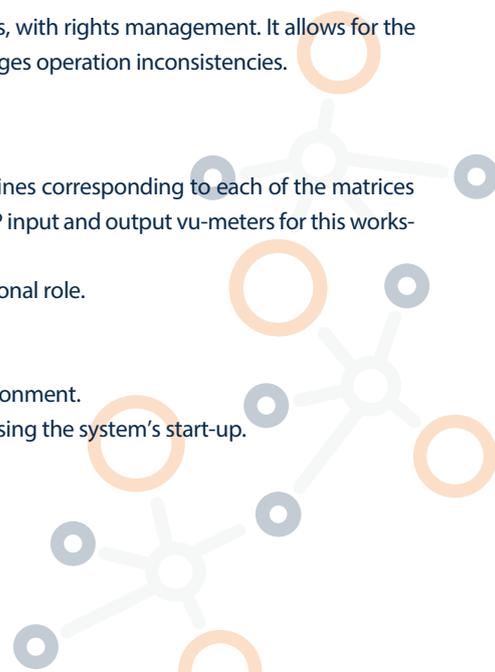
NETBOX 32 AD MX CONTROL SOFTWARE

General features

NETBOX 32 AD MX operates as an audio matrix thanks to "Netbox RTC" real-time control application, a powerful piece of software that configures, modifies and controls NETBOX 32 AD MX and NETBOX DSP audio matrices in real time.
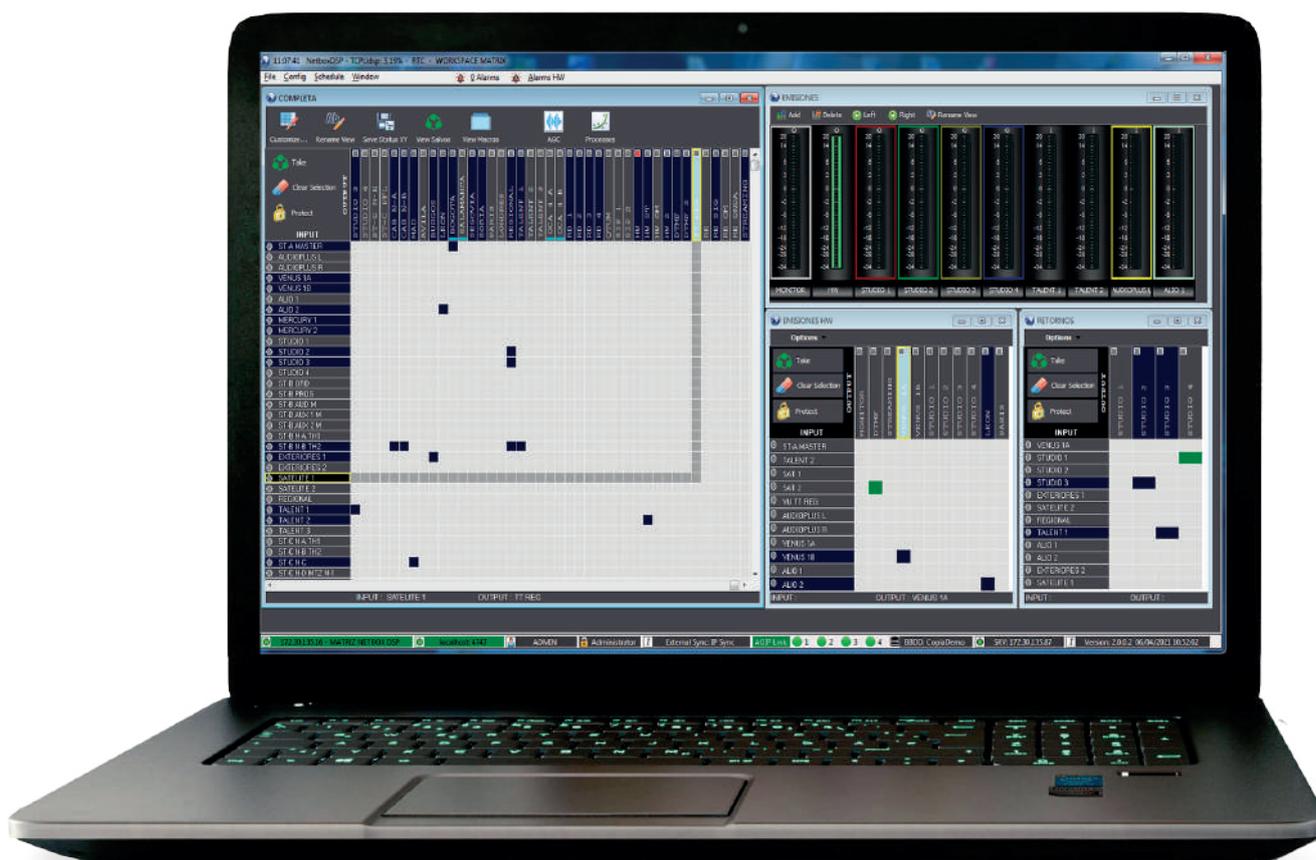
It is a multi-device and multi-user piece of software, running over Windows operating systems, with rights management. It allows for the configuration of views and particular scenarios and protection of critical lines and it also manages operation inconsistencies.

- Several matrices can be controlled from a single workstation.
- A single matrix can be controlled from several instances of the software.
- Windows can be custom defined, so each user sees only the required input and output lines corresponding to each of the matrices he/she's interested on. A workspace can have several windows as well as the required AoIP input and output vu-meters for this workstation.
- Users can be organized into groups, with different access rights according to their operational role.
- Lines can be configured and handled as mono or stereo and assigned logic names.
- For outputs, it is possible to decide which ones won't support signal summing or mixing.
- A color can be chosen to highlight different vu-meter functional types within a work environment.
- The application can import a text file with names and descriptions for each of the lines, easing the system's start-up.

NETBOX 32 AD MX CONTROL SOFTWARE

Operating with Cross points
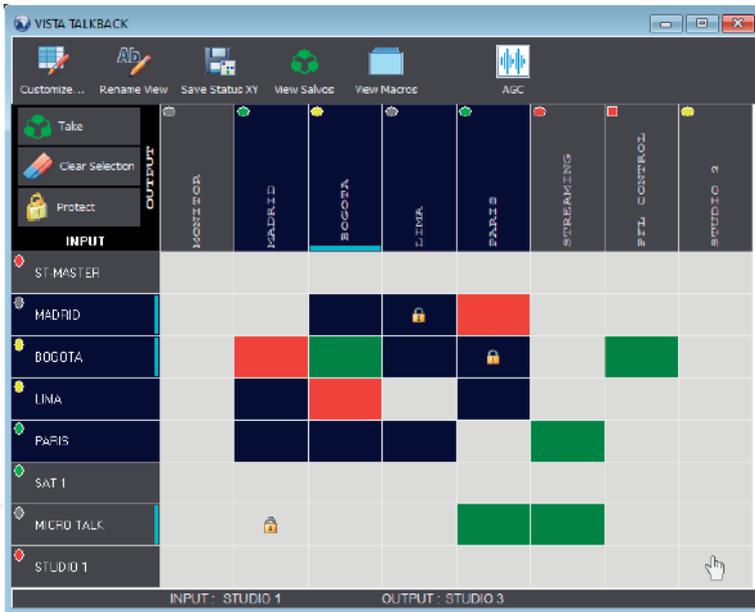
The XY window shows the inputs as rows at the left, and the outputs at the top, as columns. Next to each input or output name, there is a 4-color level indicator, different for the non-summing input, and an indicator of AGC activation.

These are the actions that can be performed on cross-points:

- Selection, by clicking on each cross-point. If it was connected, it will be highlighted in red; otherwise it is highlighted in green.
- Take: Activates or de-activates the selected cross-points. The green points are connected while the red ones are disconnected.
- Clear Selection: clears the current cross-point selection.
- Protect: locks the status of a cross-point in order to protect it, displaying a lock on it.

Using the context menu, the input and output phase can also be adjusted. A pop-up list with the connections associated to each one can be obtained.

Save Status XY option
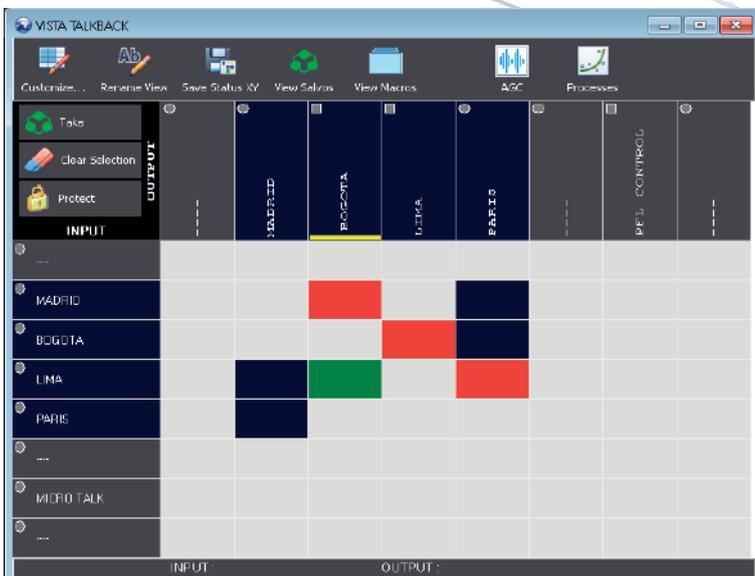
Saves current view with all the cross-points and protections, that is, it takes a snapshot of the current connections.

This snapshot can be recovered at any moment, returning the connections in the view to their original states.

A preview of the actions to be taken is presented before actually recalling a Snapshot, indicating in green and red the connections to be made or removed, respectively.

NETBOX 32 AD MX CONTROL SOFTWARE

Salvos, macros, task scheduling, alarms and logging management

Netbox RTC handles Salvos: sets of simultaneous connections to perform either manually or automatically (from the scheduling, from macros, or triggered by a physical or virtual GPI).

A salvo includes cross points to make between inputs and outputs, points to eliminate and locks of the output lines to be incorporated or released.

Critical Salvos can be defined that prompts the user for confirmation before actually been executed.
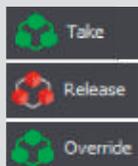
The "Take" button activates the salvo, making the connections / disconnections and cross-point locks / releases.

When clicking on the "Release", button, the inverse actions are executed on the cross points.

"Override" ignores cross point locks.

Macro is a set of cross point activations / deactivations, salvo executions or physical / virtual GPO triggers that are realized simultaneously.

These can be used manually from the XY Views, or, on the other hand, automatically whenever they have been programmed from the Scheduler or the Alarms module.

Macros, as Salvos, can be defined as critical and there is also an "Override" option available.
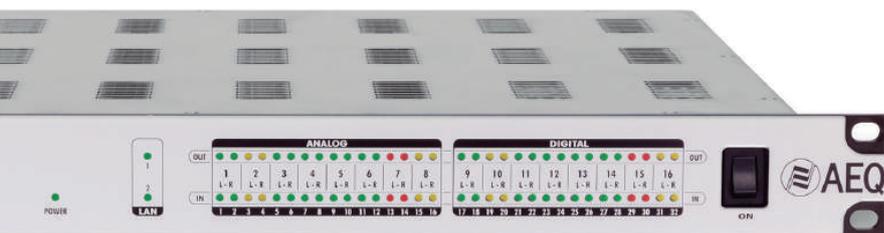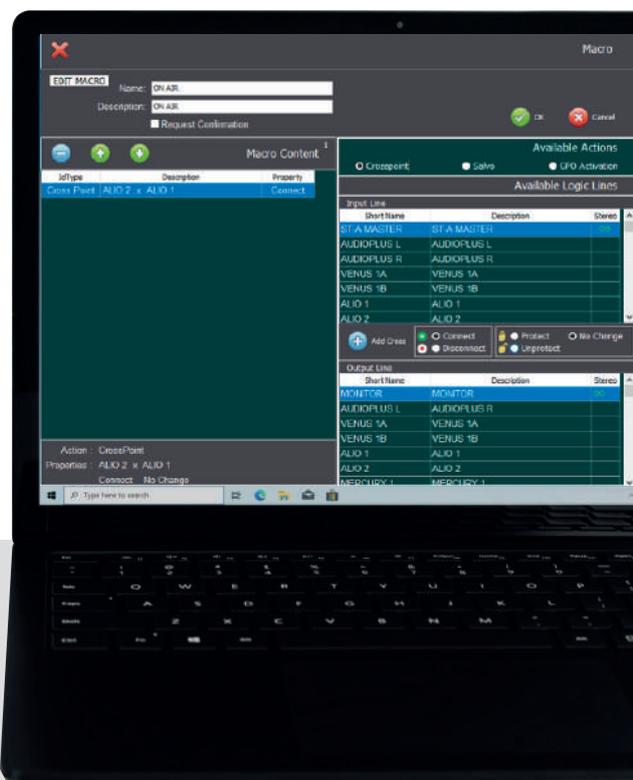
NETBOX 32 AD MX CONTROL SOFTWARE

Salvos, macros and alarms programming

01 There is a salvo and macro programming window where the date, time and repetitions for each event are defined basing on a calendar. Also there, a name is given to the event, the included salvo or macro is selected, and it is defined whether it is activated or deactivated when the event is realized.

02 Scheduled actions remain programmed in a server software that runs them at due time, taking into account the defined repetitions and foreseen exceptions.

03 Audio absence alarms can also be programmed on certain critical lines, and the execution of a macro can be associated to the alarm, triggering a switching whenever it is detected. The conditions required to revert to the normal state can also be defined.

There is a log of the scheduling and executed alarms in order to be able to investigate them and debug operation errors.
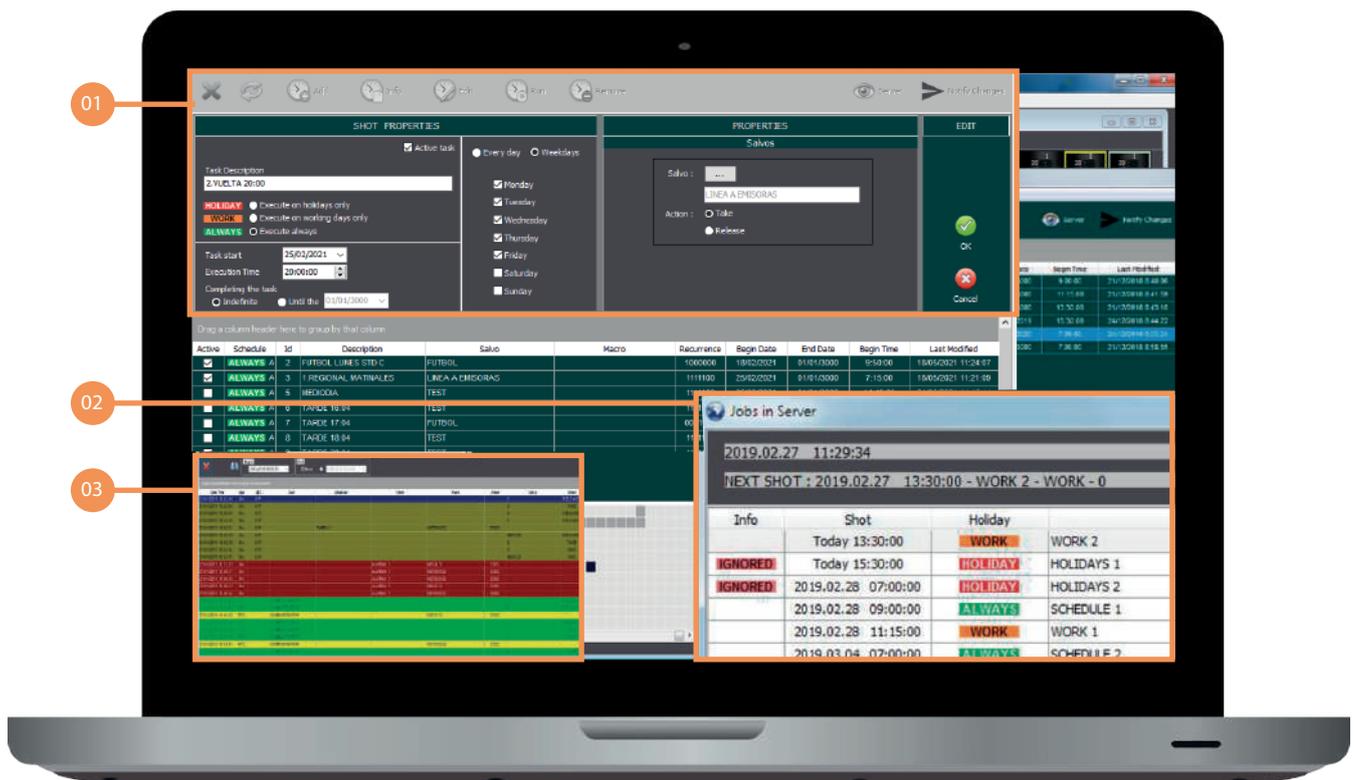
Physical and virtual GPIO management. Hardware-controlled switching

GPI: General Purpose Input is a control signal input to a device. GPO: General Purpose Output is a control signal output generated by a device.

Besides these so-called "physical" GPI and GPO, AEQ devices can also transport what's known as "virtual" GPI and GPO, transported across the IP network between pieces of equipment. A physical GPI can be linked to a virtual GPO and, conversely, a virtual GPI can trigger a physical GPO.

NETBOX 32 AD MX generates IP-transportable virtual GPO. Besides, it can receive virtual GPI from the IP network. This can be used to activate macros or salvos or to automate "NetboxRTC" software operation from an external location. Parameters such as the GPI number, its on/off status and the salvo or macro to execute must be defined. NETBOX 32 also counts with 16 optically-coupled physical GPI/Os.
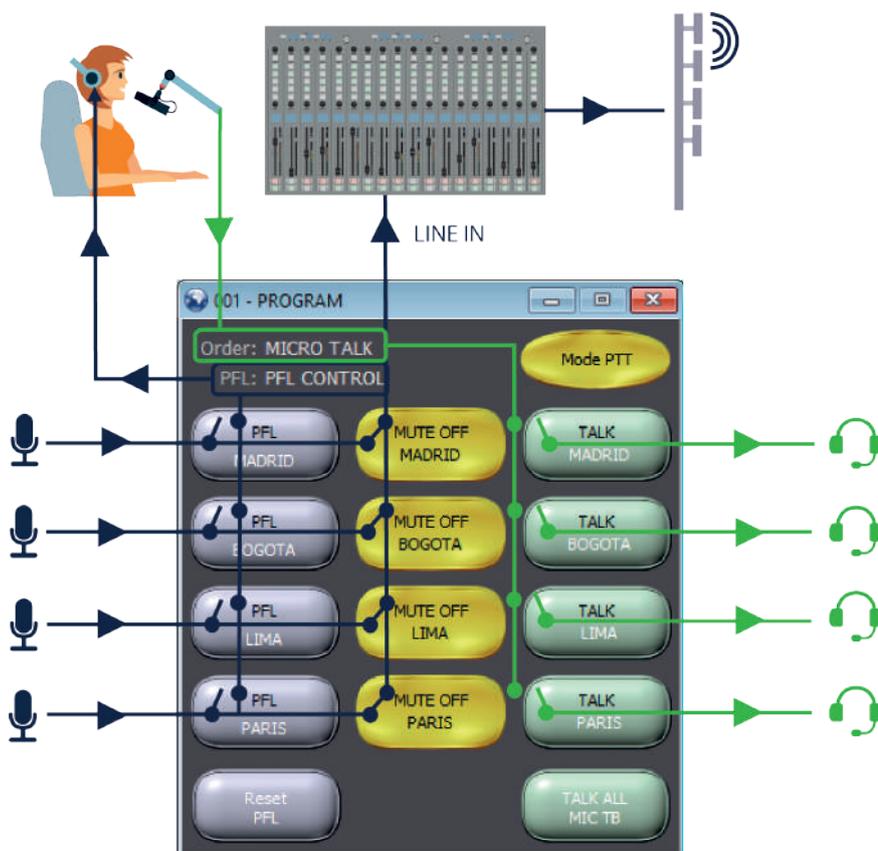
The "Hardware Switch" function allows the user to select which input is sent to a certain output depending on a physical or virtual GPI sequence. This is a full-hardware controlled operation and it doesn't require the presence of any PC to be executed.
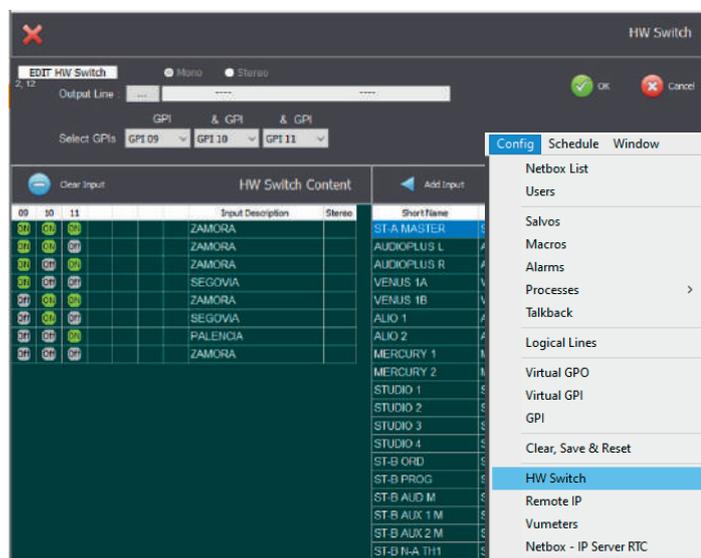
NETBOX 32 AD MX CONTROL SOFTWARE

Talkback Function

A "Talkback" group is a combination of input and output lines allowing for the automatic execution of an N-1 routing between these lines. In the default example, Madrid listens to Bogotá, Lima and Paris. Bogotá hears Madrid, Lima and Paris, and so on with the remaining two locations.

But, in order to make the job easier, an additional keyboard has been added to the matrix XY screen.

The coordinator can select which correspondents to listen to by means of the PFL buttons.

By means of the Mute OFF (active yellow) buttons, he incorporates each correspondent into the program, while at the same time joining it to the talkback group.

The coordinator can talk to one or all of the journalist by means of the TALK buttons. While he/she talks, the N-1 reception from the rest of inputs is muted to each one.

Actions on a Talkback

When a Talkback is created, the implied inputs, outputs and cross-points are cleared first. The actions executed by the Talkback on the involved cross points can be checked using a XY view. In the first image, we can see an "N-1 plus CUE", while in the second one the N-1 is substituted by a "Talk to All".
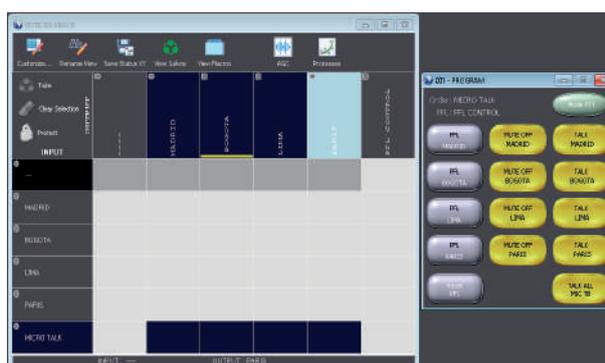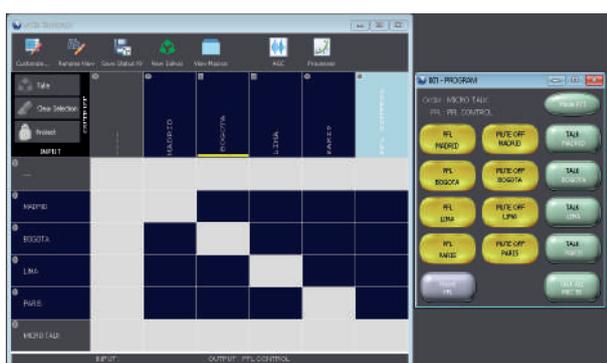
Other Tools

Nextbox RTC software offers other tools to make audio routing operation simpler, safer and more efficient. Among others:

All Connections View
Builds a XY View with all the active connections, that is, it makes all the inputs and outputs having at least one connection visible.

"Workspace" configuration
Builds the workspaces according to each user's needs, using the open, edit and rename commands to define input & output lines and vu-meters for each one.

Data Base Backup
Allows the user to create backups of all the defined configurations.

Backup Matrix
Performs a backup copy of the audio matrix status: cross points, gains, etc.
This feature is extremely useful if a matrix needs to be substituted for maintenance reasons.

Clear, Save & Reset
Resets cross-points, gains, etc...

Netbox Tool App
It is used as a configuration assistant for the device in what relates to the IP network and synchronization, among other things.

AoIP routing: bring audio to the Netbox 32 AD MX matrix

Netbox 32 AD MX has been specifically designed to operate in a Dante / AES67 AoIP network:
- • Realizes half of its connections through the AoIP network.
- • AoIP routing brings great performance to installations equipped with Netbox 32 AD MX:
  - • Wiring is made with a single IP connection between all devices.
  - • Multiple audio channels are available at any point of the network using a simple Ethernet connection.
  - • Delivers any signal present in the network to any of the AoIP installed devices' inputs.

Dante Controller Application

As a complement to Netbox RTC, Dante Controller software routes the AoIP signals in Dante or AES67 formats outside the matrix throughout the IP network.

Dante Controller AoIP routing allows for the configuration of Netbox router inputs and outputs' remote availability without moving from your chair.

This tool greatly simplifies wiring planning of Netbox matrices.

Running on Windows Operating Systems, it provides the following functions:

- • Visual reference of all Dante audio devices with the channels they publish to the network.
- • Choose the clock audio source and checking network configuration.
- • Routing audio between IP devices and checking the status of the existing audio paths.
- • Lock and unlocking of Dante devices.
- • Change audio channels' labels.
- • Customize reception latency (delay before playback).
- • Store and apply network audio routing presets.
- • Checking and establishing configuration options for each device.
- • Checking network's multicast bandwidth information and transmission / reception stats at each device.
- • Checking performance of each device, including latency and packet error statistics.
- • Checking clock status for each device, including logs with frequency offsets and clock events.
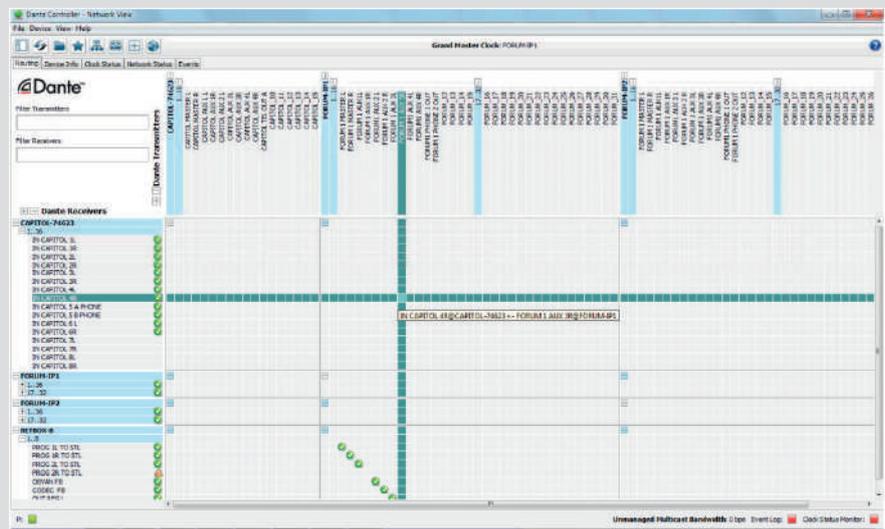
NETBOX AUDIO INTERFACES

Most current consoles and other devices are equipped with AoIP interfaces which can connect with NETBOX 32 AD MX matrix via IP. If we need to add analogue or digital microphone, line or headphone inputs and outputs to the matrix, all we need to do is installing Dante AoIP terminal devices near the sources and destinations, such as:
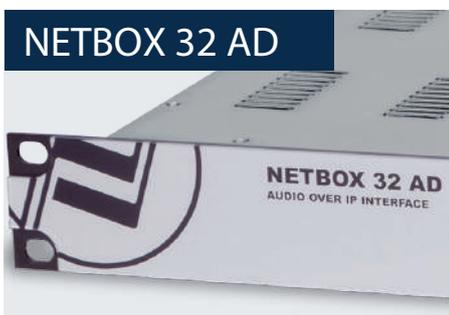
NETBOX 32 AD

This unit provides 32 local input and output channels that can be connected to the NETBOX 32 AD MX through the AoIP network. These I/O's are available as 16 mono analogue and 8 digital stereo channels. It also features 16 GPI/O's that can be transported between different AEQ devices using Virtual GPIO over IP.

NETBOX 8 AD

Netbox 8 AD provides 8 local input and output channels that can be connected to the NETBOX 32 AD MX through the AoIP network. I/O's are available in 4 mono analogue and 2 digital stereo channels.
The second digital stereo interface can be switched for a USB connection. It also offers 4 GPI /O's that can be transported between different AEQ devices using Virtual GPIO over IP.

NETBOX 4 MH

Netbox 4MH features 4 local microphone/line input and 4 output (stereo headphone + line) channels that can be connected to the NETBOX 32 AD MX through the AoIP network. It has 4 GPI and 4 GPO that can be transported between different AEQ devices using Virtual GPIO over IP. It also offers additional GPIOs for signaling terminals. PoE powered.

## AoIP system for four digital radio studios and a central control
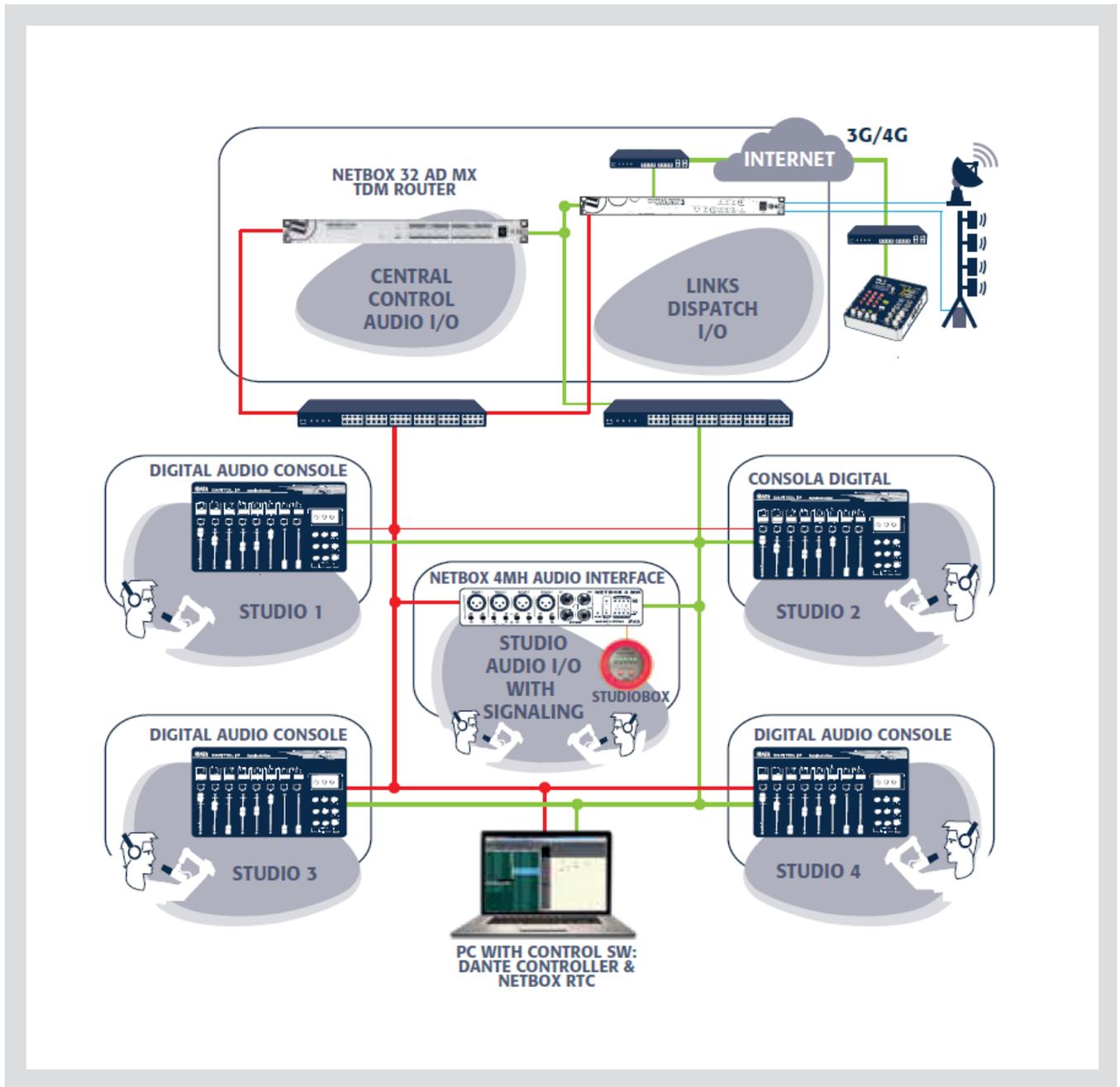
This diagram represents the installation in a typical radio station with 4 studios.

The primary IP network, connected to a IP switch, is represented in red, connecting the NETBOX 32 AD MX audio matrix, including 8 dual AES/EBU channels, another 16 analogue for the central control and 32 AoIP Dante™ channels for the studios and STL room.

There is a NETBOX 32 AD AoIP interface in this links room in order to connect to the devices installed there. Next, the 4 studio mixing consoles are represented, together with the NETBOX 4 MH installed in a shared booth.

The PC (or PCs) for audio routing control is depicted in the lower area.

The secondary IP network is represented in green. This network is required when top reliability is a must, and is connected to a different IP switch. If the control PC needs to be connected to this network, a second network card is required in that PC.
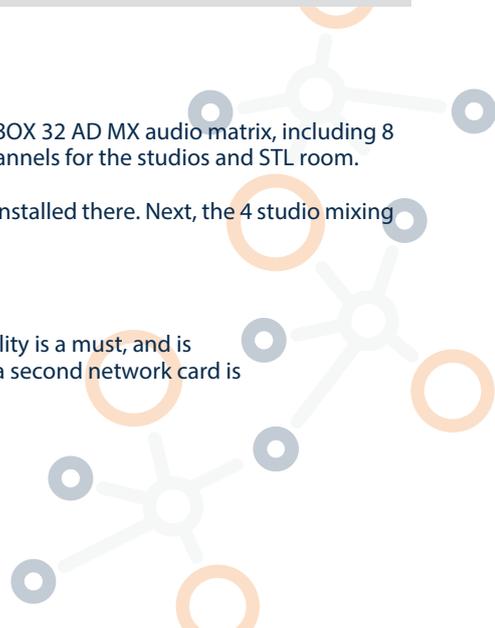
Inputs and outputs

- Analogue channels: 16 bidirectional channels.
- Dual or Stereo digital channels: 8 bidirectional channels.
- Dante / AES 67 channels: 32 bidirectional channels.
- Additional tone generator input: 1 KHz. +4 dBu (-20 dBFS).
- Bandwidth: 20 to 20.000 Hz @ +/- 0.5 dB.
- Balanced electronically analogue line-level inputs and outputs.
- Maximum analogue input and output level: +24 dBu.
- Nominal analogue input and output level: +4 dBu (-20 dBFS).

Level indicators and meters

- Three-color level indicator for all analogue and digital inputs and outputs at the unit's front panel.
- Bank of mono or stereo AoIP input and output level meters in Netbox RTC software.
- Precision level metering of a mono or stereo AoIP input or output in Netbox RTC software.
- 4-color level indicator for all audio inputs and outputs in Netbox RTC software.
- Configurable low signal level alarm for any input and output in Netbox RTC software.

GPIOs

- 16 physical GPIs at 2 DB15 connectors, including +5V power supply pin.
- 16 physical GPOs at 2 DB15 connectors, including +5V power supply pin.
- 256 virtual GPIOs that may be used to perform any of the following functions:
  - Transportation of signaling between devices.
  - Reporting audio presence at any input.
  - Indicate audio absence in any output.
  - Remote muting of any output.
  - Activation and triggering of macros and salvos.

- Physical GPI and GPO are standard GPIO, while virtual GPIO use AEQ's proprietary protocol, although it is starting to be implemented by several integrators. GPIO can also be transported through the IP network between compatible devices. This way, a GPI can drive GPOs in other equipment. This is what we call "Virtual GPIO".

Redundancy

- NETBOX 32 AD MX device optionally features a redundant power supply. In case that one of them stops receiving mains or fails, the system is fed by the other one without any operation disruption.

- NETBOX 32 AD MX includes two Ethernet ports. These may be configured in "Daisy Chain" mode, Primary / Secondary or Master / Slave modes.

- When Primary/Secondary redundancy mode is configured, the device uses Dante native redundancy system, which allows for Primary/Secondary failover without losing audio samples as seamless changeover.

DANTE ™ Network Technology

- Data format: Dante Audio over IP technology. AES67 compatible.
- Plug-and-play technology - automatic detection of the hardware and simple audio routing.
- Precise sample-level synchronization, even through several switches.
- Very low and deterministic delay in the entire network.
- Flexible and scalable network topology, supporting a great number of audio transmitters and receivers.
- Supports a single integrated network used for audio, video, control and monitoring. Compatible with other kinds of traffic using QoS management.
- Uses low-cost, off-the-self network infrastructure.
- 24-bit , 48 KHz. audio resolution.
- Delay: 1-2 ms (@ 48 KHz typical, depending on network performance and complexity).
- 2 RJ45 Ethernet ports per interface, 1000 BASE-T, transformer isolated, that can be used for redundancy or daisy-chain connections.
- Binary rate: 100/1000 Mbps.
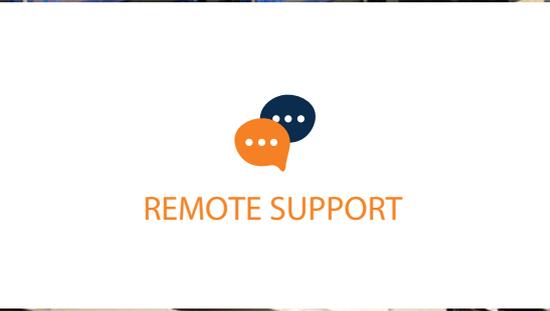- Maximum segment length: 100m max. over CAT5e or better cabling.

Mixing

- NETBOX 32 AD MX can also mix any of its inputs to any output. This means that any set of inputs can be mixed to any of the outputs. Each output gain can be individually adjusted. They can also be muted.

Audio Processing

- NETBOX 32 AD MX provides an "AGC" (Automatic Gain Control) function which can be applied to any of the AoIP inputs and outputs without limits. Simple adjustment, only a target level in dBFS needs to be specified.

General Specifications

- Cooling:
  Absolutely quiet natural convection cooling system, compatible with studio operation.

- Dimensions and weight:
  44 x 482 x 361 mm (1.73" x 19" x 14.21").
  4,5 Kg. (9.92 lbs).

- Power supply:
  Internal power supply (90 - 264V AC, 47-63Hz). Optionally redundant.

- Temperature range:
  -10 to + 45 º C (32 to 114 º F).

- Easy to install:
  NETBOX 32 is a 19" rack unit with 1U height.

REAL
TIME
CONTROL

EASY TO USE

REMOTE SUPPORT

RUTING AND MIXING

MULTI-DEVICE
AND
MULTI-USER
CONTROL

INTUITIVE SOFTWARE

DIGITAL, ANALOGUE
AND IP AUDIO

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