

## **unAIO2X2+** **2x2 AES67 Interface**



## **User Manual**

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**Revision 01\_b**

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614-00040

## IMPORTANT SAFETY INSTRUCTIONS

The symbols below are internationally accepted symbols that warn of potential hazards with electrical products.



This symbol, wherever it appears, alerts you to the presence of un-insulated dangerous voltage inside the enclosure -- voltage that may be sufficient to constitute a risk of shock.



This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Please read the manual.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and third grounding prong. The wider blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by Attero Tech
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus.
13. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
14. Unplug this apparatus during lightning storms or when unused for long periods of time.
15. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
16. This apparatus shall be connected to a mains socket outlet with a protective earthing connection.
17. When permanently connected, on all-pole mains switch with a contact separation of at least 3mm in each pole shall be incorporated in the electrical installation of the building.
18. If rack mounting, provide adequate ventilation. Equipment may be located above or below this apparatus but some equipment (like large power amplifiers) may cause an unacceptable amount of hum or may generate too much heat and degrade the performance of this apparatus,



TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.

## LIMITED FIVE YEAR WARRANTY

The equipment is warranted for five years from date of purchase from Attero Tech, LLC against defects in materials or workmanship. This warranty does not cover equipment which has been abused or damaged by careless handling or shipping. This warranty does not apply to used or demonstrator equipment. Should any defect develop, Attero Tech, LLC will, at our option, repair or replace any defective parts without charge for either parts or labor. If Attero Tech, LLC cannot correct the defect in the equipment, it will be replaced at no charge with a similar new item. Attero Tech, LLC will pay for the cost of returning your equipment to you. This warranty applies only to items returned to Attero Tech, LLC, shipping costs prepaid, within five years from the date of purchase. This Limited Warranty is governed by the laws of the State of Indiana. It states the entire liability of Attero Tech, LLC and the entire remedy of the purchaser for any breach of warranty as outlined above. NEITHER ATTERO TECH, LLC NOR ANYONE INVOLVED IN THE PRODUCTION OR DELIVERY OF THE EQUIPMENT SHALL BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, CONSEQUENTIAL, OR INCIDENTAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THIS EQUIPMENT EVEN IF ATTERO TECH, LLC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE LIABILITY OF ATTERO TECH, LLC EXCEED THE PURCHASE PRICE OF ANY DEFECTIVE EQUIPMENT.

This warranty gives you specific legal rights. You may have additional legal rights which vary from state to state.



Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules and EN55022. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.



## Contents

<b>1 – Overview.....</b>	<b>4</b>
1.1 – What’s in the Box .....	4
1.2 – Optional Extras.....	4
<b>2 – Device Installation.....</b>	<b>5</b>
2.1 – Mounting .....	6
2.2 – Status LEDs.....	7
2.3 – Hardware Connections .....	1
2.3.1 – Balanced Output to a Balanced Input.....	1
2.3.2 – Balanced Output to an Unbalanced Input .....	1
2.3.3 – Unbalanced Output to an Balanced Input .....	2
<b>3 – Device Configuration .....</b>	<b>3</b>
3.1 – IP Address Setup .....	3
3.2 – Factory Reset .....	4
3.3 – Firmware Updates .....	4
3.4 – 3rd Party Control.....	4
3.5 – Using the Command interface .....	4
<b>4 – ARCHITECTS &amp; ENGINEERS SPECIFICATION .....</b>	<b>5</b>
4.1 – Device Specifications.....	5
<b>APPENDIX A - Reference Documents.....</b>	<b>A-1</b>

## 1 – Overview

The unAIO2X2+ is a 2-in/2-out AES67 audio interface. It's ideal for adding 2 channels of AES67 audio I/O in a small, unobtrusive form factor for installed sound applications. The two inputs use 3-pin de-pluggable connectors for balanced or unbalanced I/O connectivity and support either mic or line level signals. Each input also features a 48V phantom power option. The two outputs also use 3-pin de-pluggable connectors and each provides a balanced line level output. Each output also features software adjustable volume control.

Connection to the audio network is provided by a single Ethernet RJ45 connector on the back of the unit.

The unAIO2X2+ can be powered by a 24V DC wall wart (ordered separately) but it also supports the use of PoE instead. This allows the unAIO2X2+ to be powered over the network cable from a suitable PoE source (IEEE802.3af). The PoE power option is particularly useful if the unAIO2X2+ is mounted in a remote location where access to a mains outlet is limited or indeed, nonexistent.

The unit comes in a small form factor with integrated mounting bracket allowing it to be mounted discretely in small spaces (such as under desks) close to the sources or sinks thus reducing the amount of analog cabling that may be required.



Figure 1 - unAIO2X2+ front and back

Attero Tech unIFY Control Panel application can be used to configure the device-specific features. It is also used to configure its AES67 transmit and receive streams as well.

The unAIO2X2+ also supports control by third party systems allowing external configuration of its settings such as phantom power and input gain in real time. Further information on 3<sup>rd</sup> party control can be found later in this document in section 3.5.

### 1.1 – What's in the Box

The unAIO2X2+ comes supplied with the following

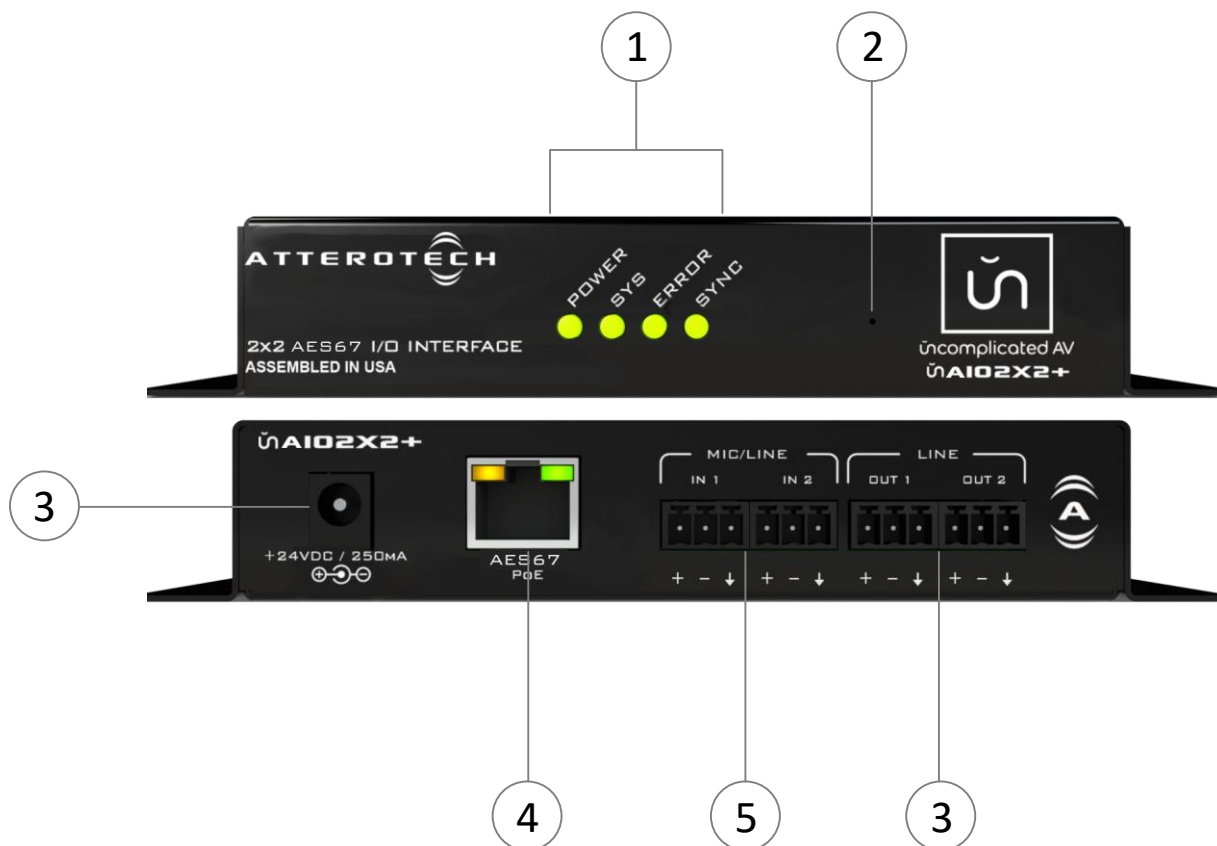
- unAIO2X2+ device

### 1.2 – Optional Extras

All of the following are available as options for the unAIO2X2+ that may be ordered separately:

- A 24 V DC power supply is available if PoE power is not desired or available – P/N: 900-00175-01

## 2 – Device Installation

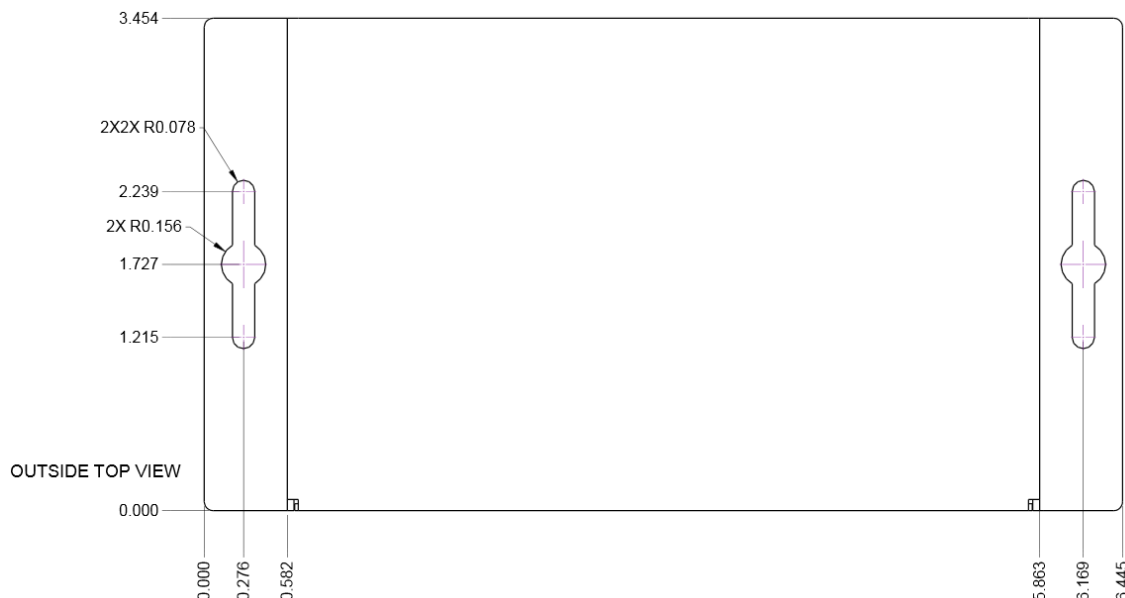


1	Status LEDs
2	Recessed Factory Reset switch
3	Power Socket – Use with optional 24V DC wall wart only
4	Ethernet interface connector and indicators
5	2 x Balanced line audio inputs
6	2 x Balanced line audio outputs

**\*Note:** The unAIO2X2+ has a label on one of the mounting flanges that shows the MAC address. This is important for initial device identification as the last 6 digits make up part of the devices default network name. The full MAC address is also given on the bottom of the unit.

## 2.1 – Mounting

It is recommended that the unit be secured to a flat surface with a screw through each mounting flange. Dimensions for mounting are shown in the Figure 2 below. Use a No. 6 screw of a type and size that is applicable to the surface to which the unAIO2X2+ will be attached.



**Figure 2 - Mounting Information**

Notes for mounting: All connections to the unAIO2X2+ should be made before the power is applied.

- Attach any audio sources that will be used to the inputs. The inputs are balanced so be sure to check what output type the source to be connected uses in order to find how to connect it correctly (see Hardware Connections section).
- Attach the outputs to the required audio devices. The outputs are balanced so be sure to check what input type the device to be connected requires in order to find how to connect it correctly (see Hardware Connections section 2.3 for further details).

When powering using PoE:

- Attach the network port to a spare PoE-enabled port on a PoE switch using a CAT-5 cable. If a mid-span injector is being used, connect a spare input port to the audio network switch using a CAT-5 cable, and then connect the corresponding output port to the network port of the unAIO2X2+.

When powering using an optional external supply:

- Attach the network port to a spare port on the audio network switch using a CAT-5 cable.
- Attach the power supply to the power input jack and then power up the external supply.

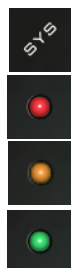
If all steps are performed correctly, the power light on the front should be lit. Some of the status LED's may also be lit or flashing.

There may also be some activity on the unAIO2X2+ Ethernet connector LED indicators. With no network, both LEDs will remain off. If an active connection is made both LEDs will come on and if there is network activity, the yellow LED will then flash.

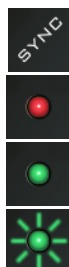
## 2.2 – Status LEDs

The front panel LED's show the Dante diagnostic status. If network or audio problems persist, these LED's may assist in resolving the issue.

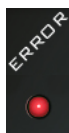
The three LED's are SYS, SYNC and ERROR and the color of each LED has different meanings. The tables below show the combination and what each combination means.



Color	Description
Red	System booting
Orange	Ethernet connection lost
Green	AES67 Interface ready



Color	Description
Red	PTP error / no PTP sync / PTP disabled
Green	PTP sync, slave
Flashing Green	PTP sync, master



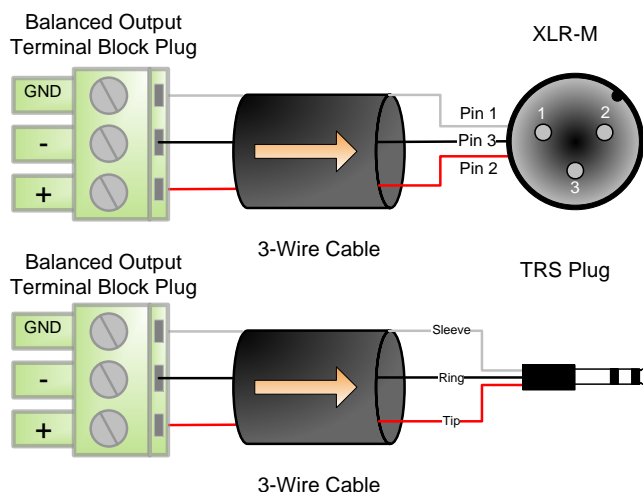
Color	Description
Red	Assigned AES67 stream not being received



## 2.3 – Hardware Connections

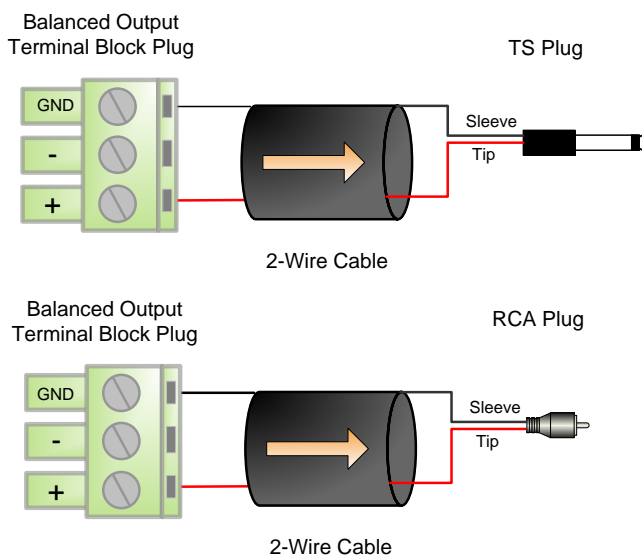
The unAIO2X2+ accepts and drives either unbalanced or balanced audio devices. Refer to the following diagrams and instructions for connecting different types of audio devices. Professional grade audio cabling is recommended to achieve the best audio performance throughout the system.

### 2.3.1 – Balanced Output to a Balanced Input



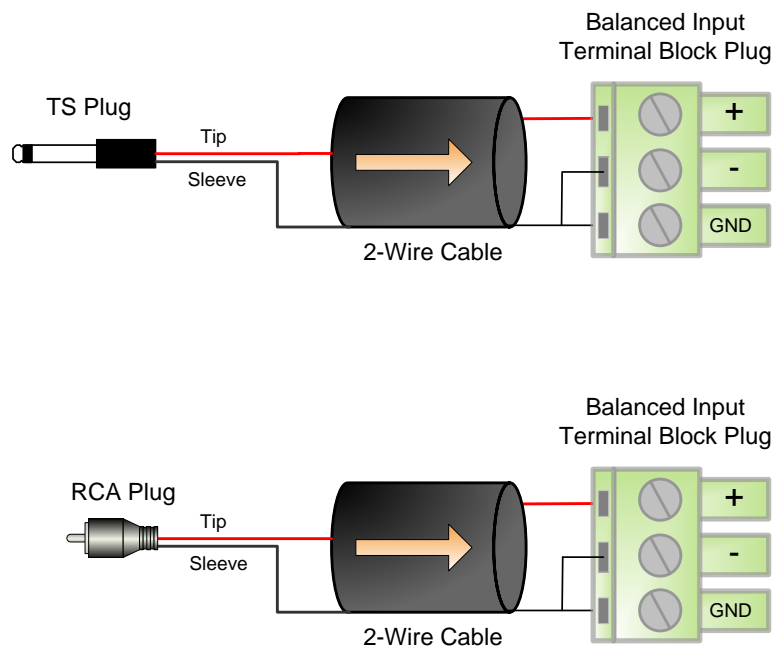
**Figure 3 - Balanced Wiring Guide**

### 2.3.2 – Balanced Output to an Unbalanced Input



**Figure 4 – Unbalanced Wiring Guide**

### 2.3.3 - Unbalanced Output to an Balanced Input



**Figure 5 - Unbalanced Wiring Guide**

## 3 – Device Configuration

There are two parts of the device that require software to setup. First the audio routing, and second the configurable features of the device itself.

Configuration of the unAIO2X2+ specific features is carried out using the Attero Tech unIFY Control Panel application. This application is available from the Attero Tech website ([www.atterotech.com](http://www.atterotech.com)). It should be used to examine and modify the device specific features such as mic/line gain settings, and phantom power.

The audio routing is also done using Attero Tech's unIFY Control Panel. There is a tab on the devices configuration for each unit specifically for setting up receive and transmit streams.

*\*Note: When using unIFY Control Panel, the unAIO2X2+ will be shown using a default device name of unAIO2X2-##### where '#####' is the last six characters of the devices MAC address.*

### 3.1– AES67 Audio Network Note

For successful deployment of Attero Tech's AES67 enabled products, it is necessary to insure the AES67 audio network is properly configured. A Quick Start Guide for AES67 Audio Networking is available from the Attero Tech Customer Portal at <https://portal.atterotech.com/home/?v=files/560321a2b075c>. As setup needs may vary by product, it may also be necessary to check with the AES67-enabled product manufacturer as well.

### 3.2 – IP Address Setup

\*\*\*\*\* **IMPORTANT** \*\*\*\*\*  
 Failure to correctly configure IP addresses will not allow a unAIO2X2+ device to correctly authenticate in the unIFY Control Panel software. The input and output channels won't be visible and routing of audio to and from the unAIO2X2+ will not be possible.  
 \*\*\*\*\*

In order to configure a unAIO2X2+ both to set up its internal parameters and also setup audio routing, the PC will need to be able to communicate with it over the network. While all AES67 devices will be discovered regardless of the IP address setup on the PC, communication can only occur if the PC and the device have compatible IP addresses.

By default, unAIO2X2+ is set to get a dynamic IP address. Like almost all network devices, if the unAIO2X2+ device does not find a DHCP server to retrieve an IP address from, it will give itself a local link address (sometimes also known as an automatic private IP address or APIPA) instead. A local link address is always in the range 169.254.x.y.

To ensure communication, the PC can either be set to get a dynamic IP address, or be given a static IP address in the range 169.254.x.y. The PC may require a restart for the changes to take effect.

In some applications, IP addresses of devices may need to be set to something specific and that can be done once initial communication has been established. Bear in mind however that if a static IP address is assigned to a device and that static IP address is in a different range to the IP it was previously using to communicate with the PC/Mac, the PC/Mac will lose communication with the device until such time as the PC/Mac IP address is also changed to an IP in range of the devices new IP address.

### 3.3 – Factory Reset

\*\*\*\*\* IMPORTANT \*\*\*\*\*

The factory reset returns the entire device to its factory defaults. Using this feature will mean all custom AES67 settings and all audio power-on default settings will be cleared.

\*\*\*\*\*

***\*NOTE:** The factory reset is a useful way of quickly restoring communications with a device which has an unknown static IP address as a factory reset returns the device's network settings to getting a dynamic IP. Having successfully completed a factory reset of the device, setting the PC's IP address to also obtain a dynamic IP address should then allow the PC to communicate fully with that device.*

The factory reset button is accessed through a small hole on the front of the unit using a small screwdriver or a paperclip. A factory reset is initiated by pressing and holding this button for 5 seconds or more while the device is running and then releasing it. If done correctly, the status will change state as the unit goes through a reset process. If the LED's remain green immediately after releasing the button, that is an indication the button was not held for long enough and the factory reset was not applied.

Having applied a successful factory reset, on the AES67 side, customized device name and channel names will be cleared, the transmit stream data cleared and disabled and any receiver stream data will be removed. The network settings will also be reset so the device will return to retrieving an IP address dynamically. The power-up defaults for the audio settings are also cleared. For every input, input gain is set back to 0dB while the input pad and phantom power settings are turned off. For every output, output volume is set to maximum (0dB) and the output mute is disabled.

### 3.4 – Firmware Updates

The unAIO2X2+ has the ability to be updated. Updates are applied via the network using Attero Tech unIFY Control Panel's Smart Firmware update facility. The latest unAIO2x2+ SFU file is available from the Attero Tech customer portal.

### 3.5 – 3rd Party Control

The unAIO2X2+ supports 3<sup>rd</sup> party control allowing external system to manage the unAIO2x2+'s settings such as phantom power, mic/line gain options and control of presets. The interface which is available to anyone to use with any device capable of sending and receiving UDP messages.

Information on the commands the unAIO2X2+ supports as well as details of how to use the 3<sup>rd</sup> party UDP interface can be found in the unIFY 3<sup>rd</sup> party Software API document, available from the registered users section of the Attero Tech website (Go to [www.atterotech.com](http://www.atterotech.com) and click on the log-in option).

### 3.6 – Using the Command interface

In order to make use of the command interface, the unAIO2X2+ simply needs to be configured with an IP address that is compatible with whatever device is doing the controlling. The control device should then be able to converse directly with the unAIO2X2+ without any further configuration necessary.

## 4 – ARCHITECTS & ENGINEERS SPECIFICATION

The AES67 break out Interface shall have two balanced mic/line analog inputs and two balanced line analog outputs. Each analog input shall be capable of driving an AES67 audio stream and each analog output shall be capable of being driven from an AES67 audio stream.

Each input channel shall have +48V phantom power, selectable via software on a per channel basis. Each input channel shall have five gain levels: -12dB (pad active), 0dB, +15dB, +30dB and +45dB, selectable via software on a per channel basis.

Each output channel shall have adjustable gain between 0dB and -60dB in 1dB increments plus a mute, selectable via software on a per channel basis.

All parameter changes will be non-volatile and self-restoring in the event of AC or PoE power interruption.

The unit shall accept either +24VDC or IEEE 802.3af standard PoE as power input. The unit shall be compliant with FCC 47CFR Parts 15B and 18 (Class A), EN 55011, ICES-003, CE (EN55022 Class A and EN55024 Class A), and RoHS requirements.

The unit shall be the Attero Tech unAIO2x2+ I/O Interface

### 4.1 – Device Specifications

Audio Inputs:	
Input Type:	Balanced and RF filtered 3-pin depluggable
Gain:	-12 dB Input Pad; 0dB, +15dB, +30dB, +45 dB software selectable
Input Impedance:	>1.8K ohms at any gain setting
Maximum Input Levels:	+20dBu @ 0dB gain (with pad active) +8dBu @ 0dB -7dBu @ +15dB gain -22dBu @ +30dB gain -37dBu @ +45dB gain
Phantom Power:	+48V, software selectable
Audio Outputs:	
Output Type:	Balanced line level with automatic muting on loss of AES67 signal
Output Volume	-60 dB to 0dB in 1 dB steps
Maximum output level:	+20dBu (@ 0dB volume)
Audio Performance:	
EIN	-119bBu (+45dB gain)
Output Noise:	<-85dBu @ 0dB gain
System THD:	<0.05% at any gain, input signal 3dB below maximum

Audio Network:	
Physical Level:	Standard Ethernet
Connector:	Single RJ-45
Cable Quality:	CAT-5e or better
Transmission Speed:	100 Mbps
Supported Sample Rates	44.1kHz 48kHz
Minimum Dante Network Latency	1 ms
Power Requirements	
PoE	802.3af PoE PD compliant
Power Consumption	< 5W Max
Cable Quality:	CAT-5e or better
Physical Dimensions	
Width	6.45"
Height	1.06"
Depth	3.45"
Weight	0.8 lbs.
Product Compliance	
FCC CFR 47 Parts 15B Class A, EN55011 ICES-003 CE (EN55022 / EN55024) RoHS REACH	

## APPENDIX A - Reference Documents

The following table lists the relevant reference documents.

Document Title	Location
unIFY 3 <sup>rd</sup> Party Software API	Registered users area on website

## Document Information

<b>Document title:</b>	unAIO2X2+
<b>Document file name:</b>	614-00040 - unAIO2x2+ User Manual.docx
<b>Revision number:</b>	<01>
<b>Issued by:</b>	Attero Tech
<b>Issue Date:</b>	11/16/17
<b>Status:</b>	Released

## Revision History

Revision	Date	Author	Description of change
00_a	08/08/17	CNL	Initial Draft
00_b	11/1/2017	AJB	Corrected grammar errors
00_c	11/13/17	CNL	Changed Front back images to that of unAIO2x2+
00_d	11/14/17	CNL	Updated Device installation image Update status LED states
01	11/16/17	CNL	Initial Release
01_a	03/15/18	SGG	Warranty Updated
01_b	03/21/18	SGG	Bug #5164 - AES67 quick start guide reference in config section