unDIO2X2+
2 x 2 Dante® Interface

User Manual

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614-00037

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.

WARRANTY INFORMATION

For a copy of the QSC Limited Warranty, visit the QSC website at www.qsc.com

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.

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Contents

1 – Overview

The unDIO2X2+ is a 2-in/2-out Dante audio interface. It's ideal for adding 2 channels of Dante 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 Dante network is provided by a single Ethernet RJ45 connector on the back of the unit.

The unDIO2X2+ can be powered by a 24V DC wall wart (ordered separately) but it also supports the use of PoE instead. This allows the unDIO2X2+ to be powered over the network cable from a suitable PoE source (IEEE802.3af). The PoE power option is particularly useful if the unDIO2X2+ 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 - unDIO2X2+ front and back

Audinate's Dante Controller or other 3rd party manufacturer's Dante routing software can be used to control the audio routing configuration of the device while the Attero Tech unIFY Control Panel application can be used to configure the device-specific features.

The unDIO2X2+ 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 3rd party control can be found later in this document in section 4.

1.1 – What's in the Box

The unDIO2X2+ comes supplied with the following
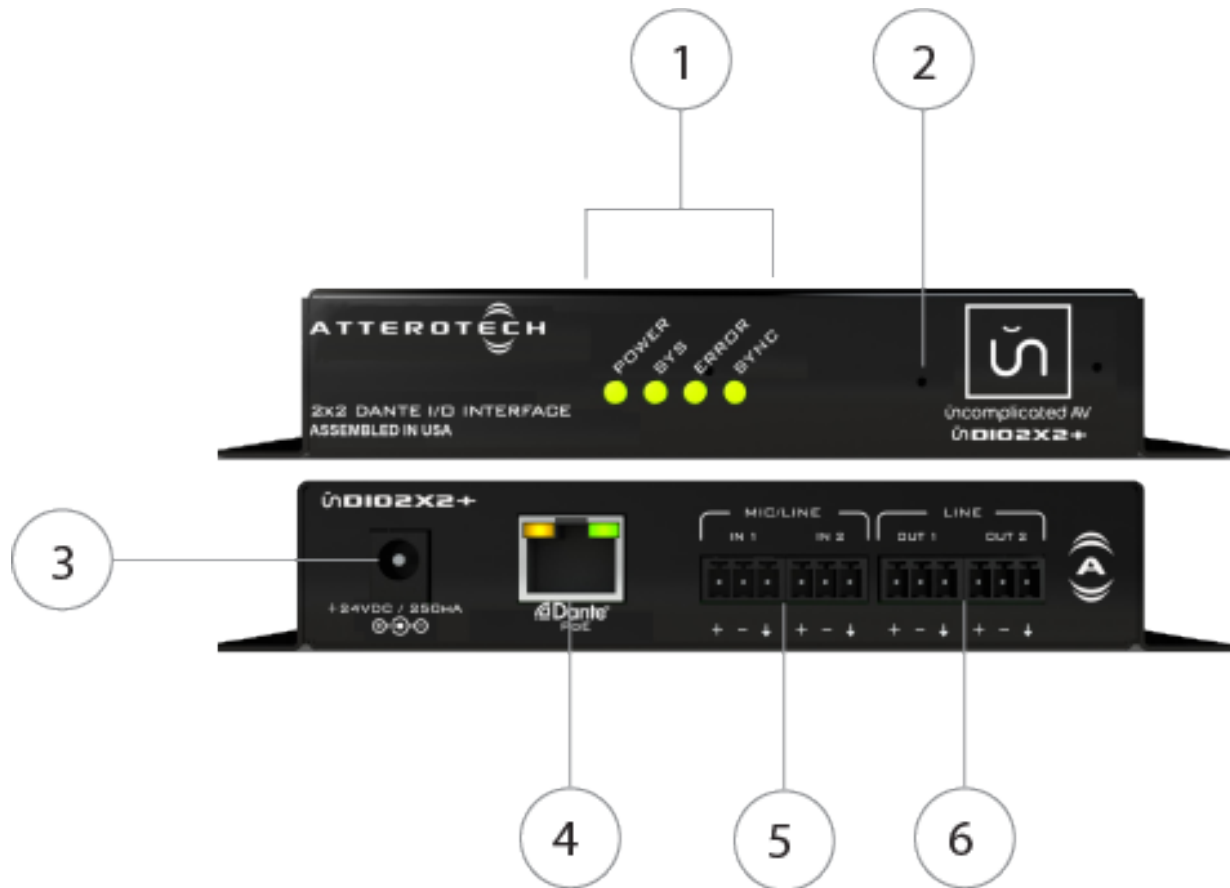 o unDIO2x2+ device

1.2 – Optional Extras

All of the following are available as options for the unDIO2X2+ that may be ordered separately:
  o 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 12 V DC wall wart only
4	Dante® Ethernet interface connector and indicators
5	2 x Balanced line audio inputs
6	2 x Balanced line audio outputs

*Note: The unDIO2x2+ 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 that is shown when the device is detected by Dante Controller. 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 show in the Figure 2 below. Use a No. 6 screw of a type and size that is applicable to the surface to which the unDIO2X2+ will be attached.
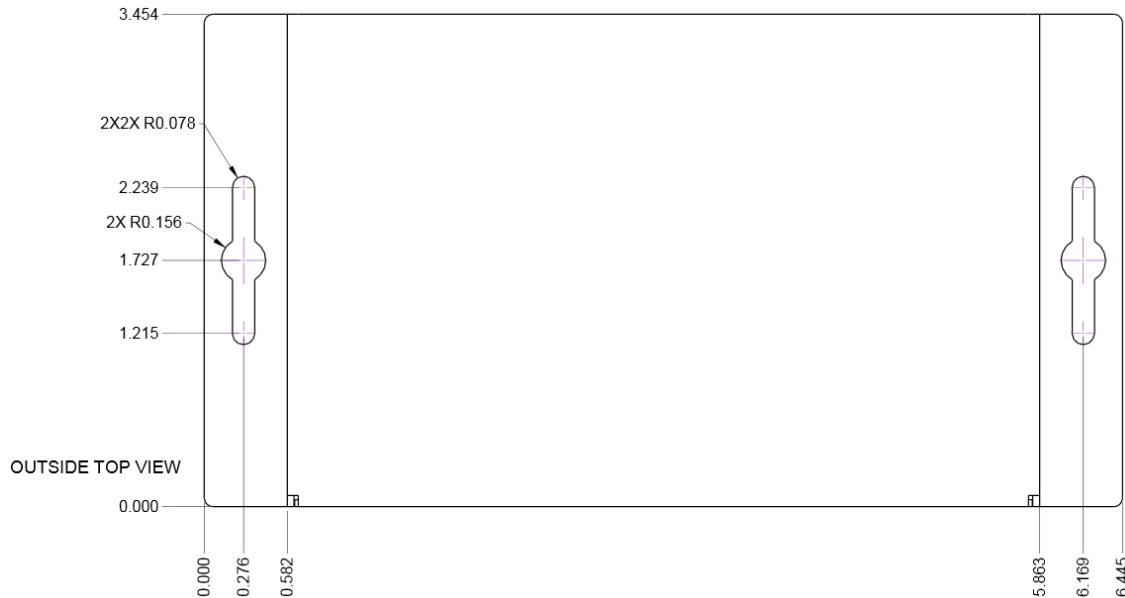

Figure 2 - Mounting Information

Notes for mounting: All connections to the unDIO2X2+ should be made before the power is applied.

- o 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).
- o 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).

Note: All Attero Tech products are tested using UTP cabling and it is recommended that UTP cabling be used when installing them. STP cabling can be used for installation though care must be taken not introduce grounding issues into the system by doing so.

When powering using PoE:
- o Attach the Dante 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 Dante network switch using a CAT-5 cable, and then connect the corresponding output port to the Dante port of the unDIO2X2+.

When powering using an optional external supply:
- o Attach the Dante port to a spare port on the Dante network switch using a CAT-5 cable.
- o 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 Dante Status LED's may also be lit or flashing.

There may also be some activity on the unDIO2X2+ Dante Ethernet connector LED indicators. With no Dante 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 ERR and the color of each LED has different meanings. The tables below show the combination and what each combination means.

	Color	Description
SYS		
● (Red)	Red	System booting
● (Green)	Green	System ready

	Color	Description
SYNC		
● (Yellow)	Yellow	PTP currently syncing
● (Red)	Red	PTP error / no PTP sync / PTP disabled
● (Green)	Green	PTP Slave, with PTP sync
✸ (Flashing Green)	Flashing Green	PTP master

	Color	Description
ERROR		
● (Yellow)	Yellow	Capability is corrupted
● (Red)	Red	Memory stack overflow

Identify (SYS, SYNC and ERR LED's flashing)

(Activated through the Identify function of Dante Controller)

2.3 – Hardware Connections

The unDIO2X2+ 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
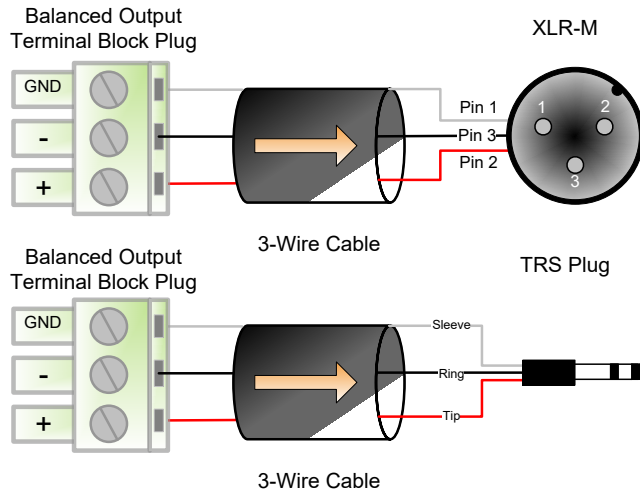

Figure 3 – Balanced Wiring Guide

2.3.2 – Balanced Output to an Unbalanced Input
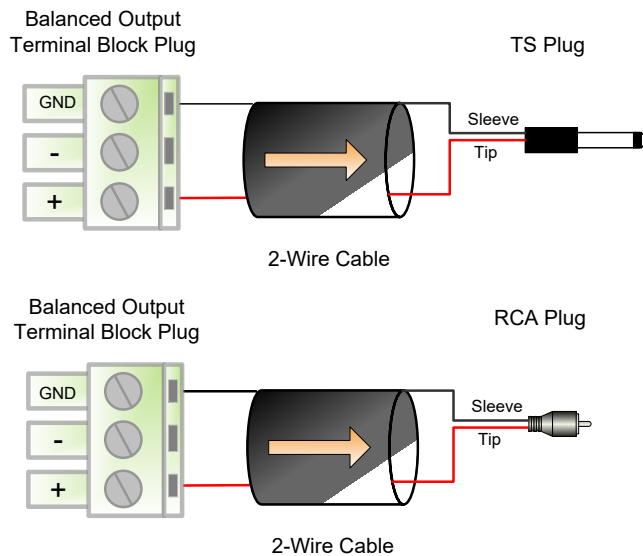

Figure 4 – Unbalanced Wiring Guide

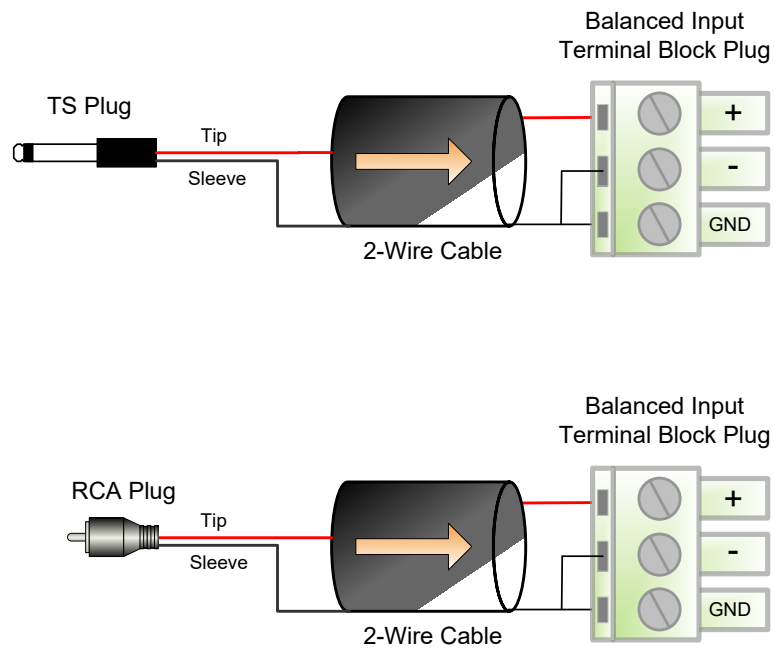## 2.3.3 – Unbalanced Output to an Balanced Input

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.

The audio routing should be carried out using any application that supports Dante audio routing. This could be from a 3rd party manufacturer or be Audinate's own Dante Controller. Dante Controller can be obtained from the Audinate website (www.Audinate.com). Instructions on how to use this software and about setting up routes on a Dante network can also be found on Audinate's website.

Note: When using Dante controller, the unDIO2X2+ will be shown using a default device name of unDIO2X2-###### where '######' is the last six characters of the devices MAC address.

Configuration of the unDIO2X2+ 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). It should be used to examine and modify the device specific features such as mic/line gain settings, phantom power, and output boost options.

3.1 – IP Address Setup

*** **IMPORTANT** ***
Failure to correctly configure IP addresses will not allow an unDIO2X2+ device to correctly authenticate in the unIFY Control Panel software and while it will show up in Dante Controller, the input and output channels won't be visible and routing of audio to and from the unDIO2X2+ will not be possible.

In order to configure an unDIO2X2+ 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 Dante 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, unDIO2X2+ is set to get a dynamic IP address. As with all Dante devices, if the unDIO2X2+ device does not find a DHCP server to retrieve an IP address from, it will give itself an automatic private IP address (APIPA) instead. An APIPA 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.

Further information on IP setup for an audio system using Dante can be found in the FAQ's on the Audinate website (https://www.audinate.com/resources/faqs).

3.2 – Factory Reset

*** **IMPORTANT** ***
The factory reset returns the entire device to its factory defaults. Using this feature will mean all custom Dante 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 Dante status LEDs will change state. They will all turn off except for the "SYS" LED which will turn red for a couple of seconds. All three LED's will then briefly turn orange, before the device then reboots and a normal start-up procedure begins. 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 Dante side, customized device name and channel names will be cleared and any receive flow subscriptions 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.

4 – 3ʳᵈ Party Control

The unDIO2X2+ supports 3ʳᵈ party control allowing external system to manage the unDIO2x2's settings such as phantom power, mic/line gain options and control of presets.

There are two control interface types available for the unDIO2X2+. The first type is a Dante proprietary interface which is typically used by devices already that have built-in support for Attero Tech devices. The second type supports a 3ʳᵈ party UDP interface and is available to anyone to use with any device capable of sending and receiving UDP messages.

Information on the commands the unDIO2X2+ supports as well as details of how to use the 3ʳᵈ party UDP interface can be found in the uNIFY 3ʳᵈ party Software API document, available from the registered users section of the Attero Tech website (Go to www.atterotech.com and click on the log-in option).

4.1 – Command Interface Type

The type of command interface a specific unDIO2X2+ supports is defined by the Dante firmware it has been loaded with. There are two methods to determine which Dante firmware and thus which command interface that is:

1) Run uNIFY Control Panel V2.2 or later. Right-click on the device, and select the "Device Info" option. The interface type is shown indicated by the "Control Type" field. A "-C" means the device is using the Dante Proprietary interface. A "-U" means the device is using the 3ʳᵈ party UDP interface.

2) Using Dante Controller, double-click on the device in question, select the "Status" tab and look for the "Firmware Version" parameter in the "Device Information" box. If the Firmware Version is V1.x.x, the device is using the Dante Proprietary interface. If it's V2.0.0, the device is using the 3ʳᵈ party UDP control interface.

A device's command interface can be changed simply by updating the device's Dante firmware. Moreover, this can be done in the field in almost all cases. The tools and necessary firmware files for updating a device's command interface can be obtained from the registered users section of the Attero Tech website (Go to www.atterotech.com and click on the log-in option). The firmware files have an extension .DNT (otherwise known as "donut" files) and there is one for each command interface type. The file with the –C in its name supports the Dante proprietary interface while the one with "-U" in its name supports the 3ʳᵈ Party UDP interface.

4.2 – Using the Command interface

In order to make use of the command interface, regardless of type, the unDIO2X2+ simply needs to be configured with an IP address that is compatible with the device doing the controlling. The control devices should then be able to converse with the unDIO2X2+ without any further configuration necessary.

5 – ARCHITECTS & ENGINEERS SPECIFICATION

The Dante 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 a Dante audio flow, and each analog output shall be capable of being driven from a Dante audio flow.

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 plus mute in 1dB increments, 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 Part 15, CE, RoHS requirements.

The unit shall be the Attero Tech unDIO2x2+ I/O Interface.

5.1 – 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 Dante signal
Output Volume	-60 dB to 0dB in 1 dB steps
Maximum output level:	+20dBu
Audio Performance:	
EIN	-119bBu (+45dB gain)
Output Noise:	<-85dBu @ 0dB gain
System THD:	<0.05% at any gain, input signal 3dB below maximum

Dante 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	1ms
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 3rd Party Software API	Registered users area on website
Dante Firmware Update Quick Start	Registered users area on website

Document Information

Document title:	unDIO2X2+
Document file name:	unDIO2x2+ User Manual.docx
Revision number:	<01_b>
Issued by:	Attero Tech
Issue Date:	10/16/17
Status:	Released

Revision History

Revision	Date	Author	Description of change
00_a	01/20/17	JDAL	Initial Draft
00_b	02/09/17	CNL	Changes following review
00_c	02/23/17	JDA	Corrected artwork, minor changes to copy. Ready for release.
01	02/24/17	CNL	Release Version
01_a	07/14/17	CNL	Added chart for status LED meanings
01_b	10/16/17	CNL	Bug #3484 – Add statement in manual regarding UTP/STP cable
01_c	03/14/18	SGG	Warranty Updated