unHX2D

Dante™/AES67-enabled HDMI Audio De-embedder/Embedder

User Manual

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Revision 01_c

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614-000388

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 when a 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, an 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, generate too much heat and degrade the performance of this apparatus,
19. This apparatus may be installed in an industry standard equipment rack. Use screws through all mounting holes to provide the best support.

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.

$$C\,E$$

This symbol means the product must not be discarded as household waste, and should be delivered to an appropriate collection facility for recycling. Proper disposal and recycling helps protect natural resources, human health and the environment. For more information on disposal and recycling of this product, contact your local municipality, disposal service, or the business where you bought this product.

Contents

1 – Overview

The unHX2D is a Dante™/AES67 enabled HDMI de-embedder/embedder designed to bridge 2-channel PCM HDMI audio to/from a Dante™/AES67 audio network. In addition, the unHX2D includes two line level analog inputs and outputs that can be independently bridged to/from a Dante audio network and/or the HDMI.

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

Audinate's Dante™ Controller or other 3rd party manufacturer's Dante™ routing software can be used to control the Dante™ audio routing configuration of the device while the Attero Tech unIFY Control Panel application can be used to configure the device-specific features. Dante™ Controller is also used to enable the AES67 streams for the device.

Figure 1 – unDHX2D front and back

1.1 – Extended Features

o **Delay** - An adjustable 400ms audio delay buffer is included on the Dante output for audio and video lip sync.

o **Mixing** - Flexible stereo matrix audio routing between system input sources and outputs and facilitates bridging audio from either video sources or monitors to a Dante network.

		OUTPUT MIXING			
		HDMI Out (2CH PCM)	S/PDIF Out	Dante TX 1-2	Dante TX 3-4	Analog Out
INPUTS	HDMI In (2CH PCM)	●	●	●	●	●
	S/PDIF In (2CH PCM)	●		●	●	●
	Dante RX 1-2	●		●	●	●
	Dante RX 3-4	●		●	●	●
	Analog In	●		●	●	●

o **HDMI Repeater** – The HDMI output operates as a pass thru HDMI 2.0 compliant (HDCP 2.2) repeater of a HDMI input video source, capable of up to 4K, 4:4:4 video.

o **EDID Management** – Installer adjustable EDID management settings via software.

o **SPDIF Output** – Unlike the other outputs that can have a mix of audio, the SPDIF output is locked to the audio from the HDMI input stream only.

o **SPDIF Input** – This input can be routed to Dante™/AES67, re-embedded to the HDMI output.

o **3rd Party Control** – The unHX2D also supports control by third party systems allowing external configuration of its settings such as input sensitivity, internal source routing, EDID management and status monitoring in real time. Further information on 3rd party control and software tools can be found by downloading the supporting API documentation at https://www.atterotech.com/registered-downloads/.

o **Hot Plug Override** – Configurable Hot Plug Detect supports typical repeater scenarios but can also be overridden to allow de-embedding of the HDMI audio source without a connected HDMI sink on the unHX2D HDMI output.

o **HDCP Override** – HDCP can be disabled on the input in order to signal source devices, such as Mac computers to output unencrypted content when used with downstream devices that don't support HDCP.
Note: This feature does not strip content protection from HDCP compliant sources.

o **Dante™/AES67 Mono Mixdown** – The Dante outputs feature a mono mix option that sums the stereo output channel to a mono mix.
- Dante Out 1 = 50% L + 50% R (Mixed from Dante 1 and 2 assigned channels)
- Dante Out 2 = 100% R
- Dante Out 3 = 50% L + 50% R (Mixed from Dante 1 and 2 assigned channels)
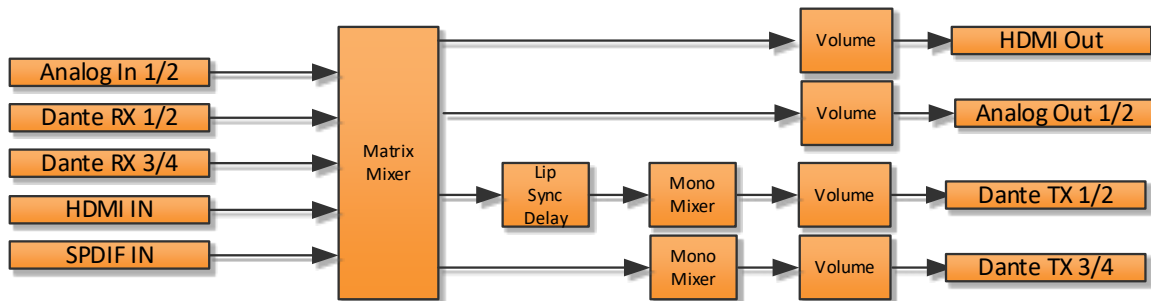- Dante Out 4 = 100% R

Figure 2 – Internal Audio Signal Flow

1.2 – What's in the Box

The unHX2D comes supplied with the following:
o (1) unHX2D device

1.3 – Optional Extras

The following are available as options for the unHX2D and may be ordered separately:
o 24V DC Power Supply - P/N: 900-00175
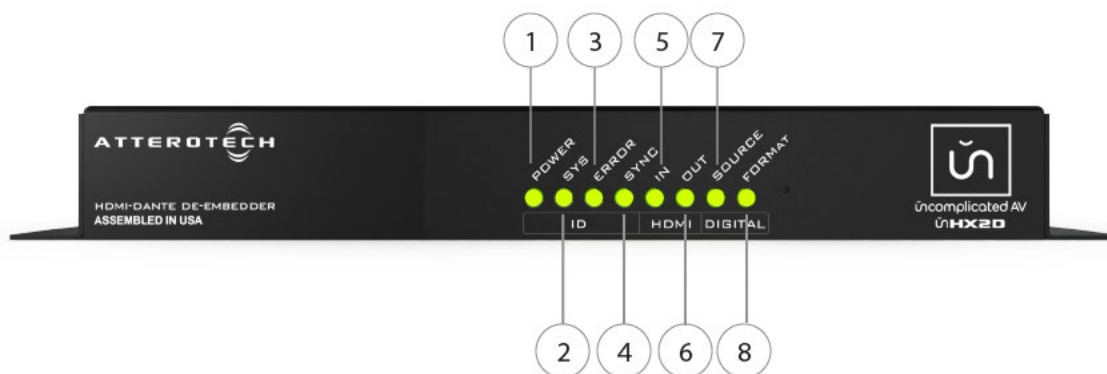
2 – Device Installation

Figure 3 – unHX2D Front Panel

1	Power LED
2	Dante™/AES67 System Status LED
3	Dante™/AES67 Error Status LED
4	Dante™/AES67 Sync Status LED
5	HDMI Input Port Status LED
6	HDMI Output Port Status LED
7	Source Indicator LED
8	Digital Format Indicator LED

Table 1 - Front Panel Features

9	Power Input Strain Relief
10	DC Power Input
11	Dante™/AES67 PoE Port
12	Analog Audio Input – Balanced Line Level
13	Analog Audio Output – Balanced Line Level
14	S/PDIF Input (Toslink(
15	HDMI Input
16	HDMI Output
17	S/PDIF Output (Toslink)

Table 2 - Rear Panel Features

Figure 4 – unHX2D Rear Panel

Note: The unHX2D *has a label on the flange and on the base of the unit that shows the device's MAC address. This is important for initial device identification as the last six digits make up part of the device's default network name that is shown when the device is detected by Dante™ Controller.*

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 **Figure 5** below. Use a No. 6 screw of a type and size that is applicable to the surface to which the unHX2D will be attached.
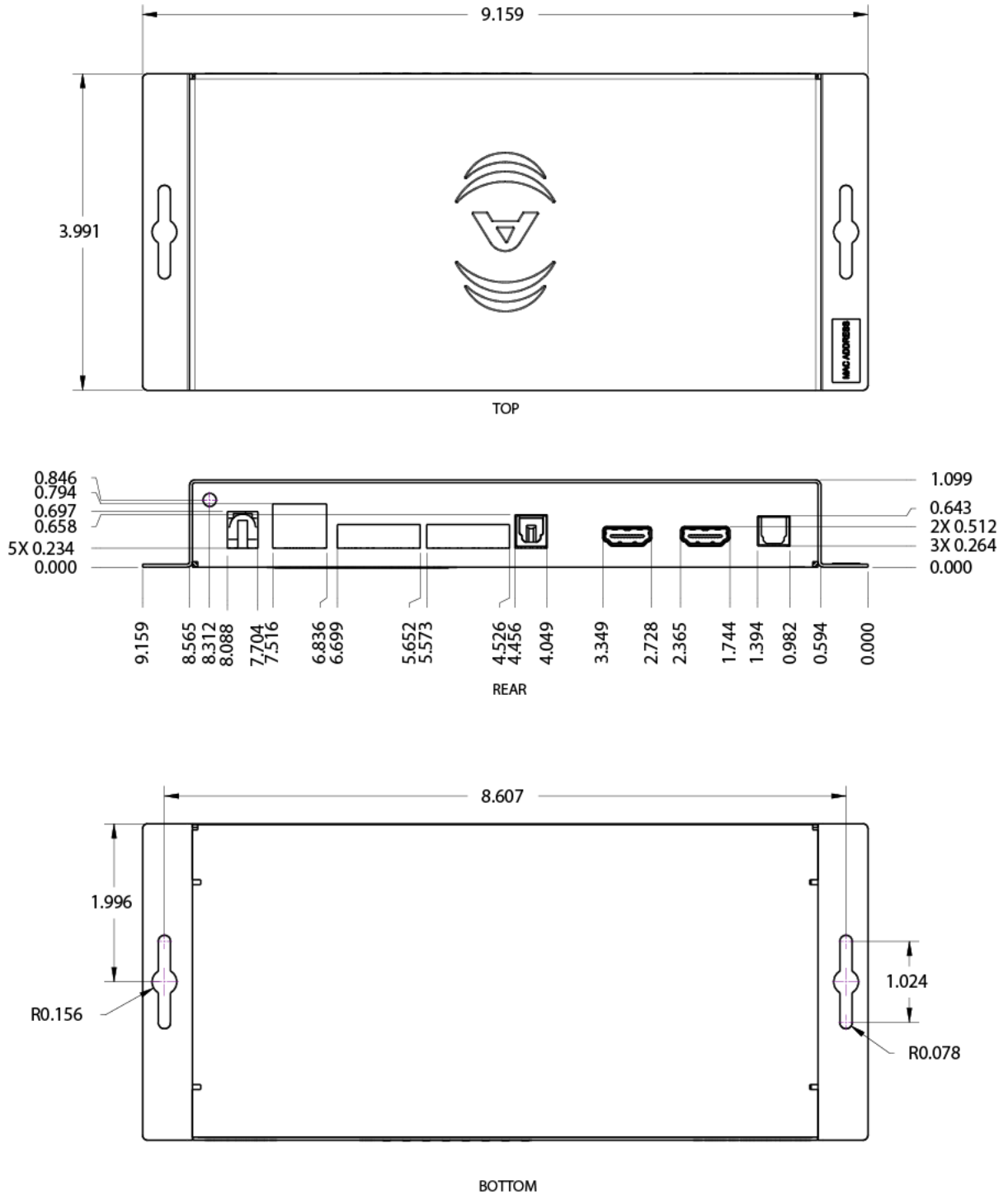
Figure 5 – Mounting and Dimension Information

Notes for mounting: All connections to the unHX2D should be made before the power is applied.
- o Attach any audio sources that will be used to the analog audio inputs. The analog audio 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 analog 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 0 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™/AES67 port to a spare PoE-enabled port on a PoE switch using a CAT-5 cable or better. If a mid-span injector is being used, connect a spare input port to the Dante™/AES67 network switch using a CAT-5 cable, and then connect the corresponding output port to the Dante™/AES67 port of the unHX2D.

When powering using an optional external supply:
- o Attach the Dante™/AES67 I/F port to a spare port on the Dante™/AES67 network switch using a CAT-5 cable or better.
- 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 status LED's may also be lit or flashing.

If the Dante™/AES67 interface is being used, there may also be some activity on the unHX2D Dante Ethernet connector LEDs. If the cable is connected and no network is detected, 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 – Hardware Connections

The unHX2D 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.

2.2.1 – Balanced Output to a Balanced Input
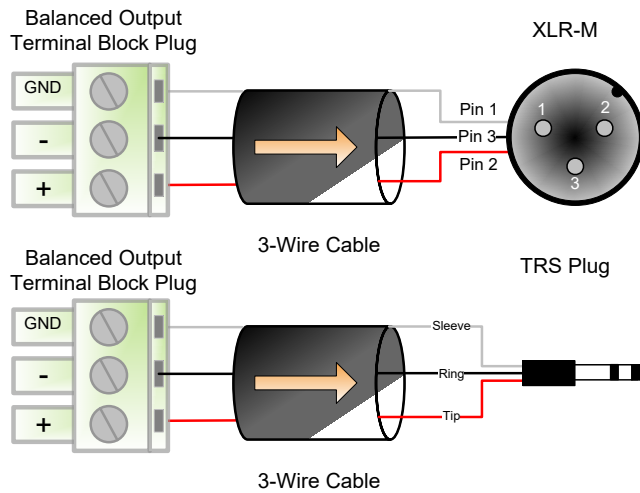

Figure 6 – Balanced Wiring Guide

2.2.2 – Balanced Output to an Unbalanced Input
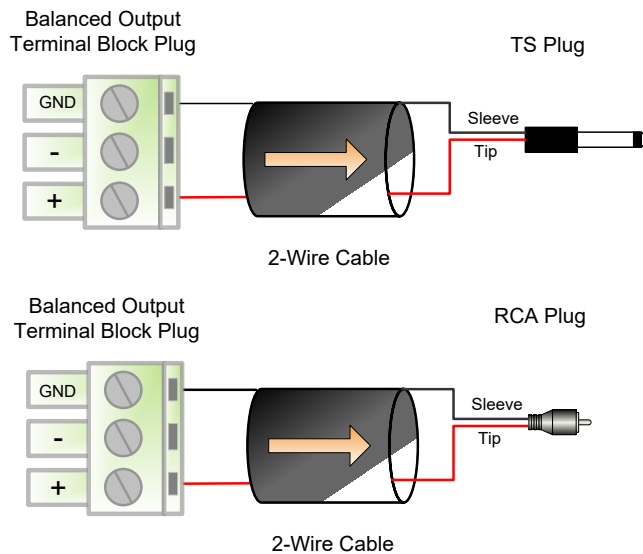
Figure 7 – Unbalanced Wiring Guide

2.2.3 – Unbalanced Output to an Balanced Input

Balanced Input
Terminal Block Plug

TS Plug

Tip

Sleeve

2-Wire Cable

+

-

GND

Balanced Input
Terminal Block Plug

RCA Plug

Tip

Sleeve
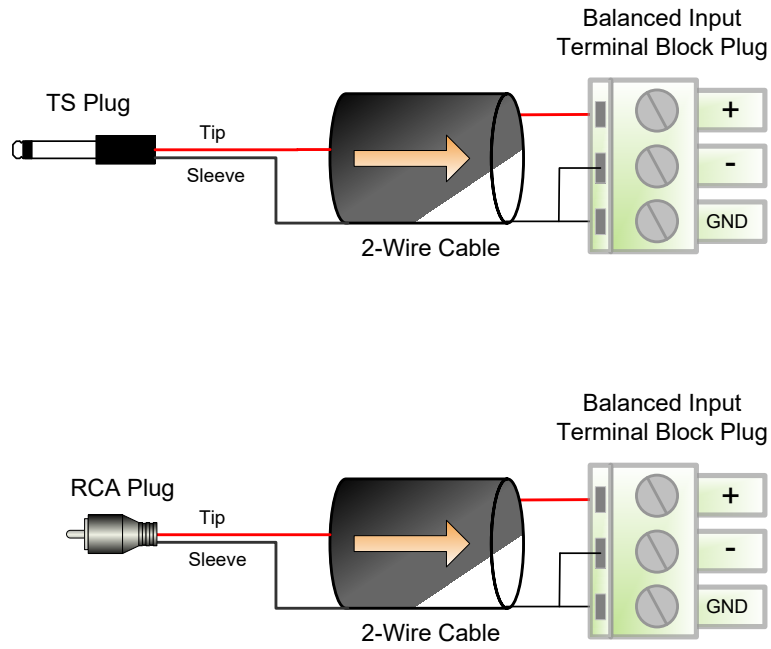
2-Wire Cable

+

-

GND

Figure 8 – Unbalanced Wiring Guide

3 – Device Configuration

There are two parts of the device that require software to setup. First are the configurable features of the device and second is the Dante™/AES67 audio routing.

Configuration of the unHX2D 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 input sensitivity and internal audio source routing.

If the Dante™/AES67 audio is used, the audio routing should be carried out using any application that supports Dante™/AES67 audio routing. This could be from a 3ʳᵈ party manufacturer or 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 unHX2D *will be shown using a default device name of* unHX2D-###### *where '######' is the last six characters of the device's MAC address.*

3.1 – IP Address Setup

*** IMPORTANT ***
Failure to correctly configure an IP address will not allow an unHX2D device to correctly authenticate in the uniFY Control Panel software and while it will be detected by Dante Controller, it will not appear in the routing table. It will be visible on the "Device Info" page, though only its name will present and all other information will be blank. Other information on the unHX2D in other parts of Dante Controller will also either be blank or marked "N/A". In this state, it will also not be possible to route audio to and from the unHX2D either.

In order to configure an unHX2D 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, the unHX2D is set to get a dynamic IP address. As with all Dante™/AES67 devices, if the unHX2D 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 (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 its IP address setup to take effect.

Further information on IP setup for an audio system using Dante™/AES67 can be found in the FAQ's on Audinate's 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™/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 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 LEDs will then briefly turn orange, before the device then reboots and a normal start-up procedure begins. If the LEDs 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.

3.3 – Status LEDs

The front panel of the unHX2D features 8 bicolor LEDs used to indicate various device information and status. Some of these indications may occur simultaneously.

Front Panel Status Indicator	LED State	Function / Status
	Power LED flashing Green continuously	Identify feature has been activated remotely. This is feature is used to help the installer identify the device on the network.
	SYS / ERROR / SYNC LEDs flash green, on and	Find Unit feature has been remotely activated. This is feature is used to help the installer identify the device on the network. Automatically reverts back to normal operation after 8 seconds.
	Power LED stays red continuously after boot	A critical error has occurred. Try power cycling the device, if the problem persists contact Attero Tech technical support.
	ERROR status LED stays red	A critical Dante™/AES67 processor failure has occurred. Try power cycling the device, if the problem persists contact Attero Tech technical support.
	ERROR status LED stays amber	The Dante™/AES67 firmware has become corrupt. Try power cycling the device. If the problem persists, try updating the device firmware. Contact Attero Tech technical support if the problem remains.
	SYNC LED is lit amber	The unHX2D is synchronizing its Dante™/AES67 clock.
	SYNC LED is lit red	Loss of clock synchronization, analog outputs are automatically muted.
	SYNC LED is lit green and steady on	Clock is synchronized and slaved to an external Dante™/AES67 device.

	SYNC LED is lit green and flashing	Clock is synchronized and is operating as the Dante™/AES67 clock master for the network
	HDMI IN LED is green	HDMI Input is connected and HDCP is enabled on the input.
	HDMI IN and OUT LEDs are green	Both HDMI Input and output are connected and HDCP is enabled on the input as well as the connected sink device.
	HDMI IN LED is flashing amber	HDMI Input is connected and HDCP has been disabled on the input.
	SOURCE LED is green	HDMI Input audio is routed to Dante™/AES67 Outputs 1 and 2.
	SOURCE LED is amber	A mix of input sources is routed to Dante™/AES67 Outputs 1 and 2.
	SOURCE LED is red	SPDIF Input audio is routed to Dante™/AES67 Outputs 1 and 2.
	FORMAT LED is amber	EDID is set for "Copy Thru" and could potentially carry non-PCM multichannel audio.
	FORMAT LED is green	EDID is set for PCM.

4 – 3ʳᵈ Party Control

The unHX2D supports 3ʳᵈ party control of the device parameters.

There are two control interface types available for the unHX2D. The first type is a Dante™/AES67 proprietary interface which is typically used by devices that already 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 unHX2D 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 unHX2D 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 V2.3 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 is 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 unHX2D 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 unHX2D without any further configuration necessary.

5 – ARCHITECTS & ENGINEERS SPECIFICATION

The interface shall accept HDMI video signals in pass-through mode, compliant with Revision 2.0 of the HDMI specification and revision 2.2 of the HDCP specification.

Two channel PCM audio shall be capable of being embedded in the HDMI output from the HDMI input, analog line level inputs, or two channels from a Dante™/AES67 audio network.

De-embedded two channel PCM audio from the HDMI input shall be capable of being bridged onto 2 channels on a Dante™/AES67 network or output on the S/PDIF TOS Link output.

The analog line level output can render audio from two channels of a Dante™/AES67 network.

Analog line level output is software controllable over a 60dB range in 1dB steps.

The device shall have network real-time monitoring and control of analog input sensitivity, output level, audio matrix routing, lip sync delay, and EDID management settings.

The interface shall be compatible with Attero Tech unIFY software for flexible control and monitoring in system applications.

The interface shall be compliant with the RoHS directive.

The interface unit shall be compliant with the EMI/EMC requirements for FCC and CE.

The interface shall be the Attero Tech unHX2D.

5.1 – Device Specifications

Analog Audio Inputs	
Input Type	Balanced 3-pin line level
Input Sensitivity	–10dBV (consumer) or +4dBu (Pro) software selectable
Input Impedance	10 kΩ
Maximum Input Levels	+20 dBu (+/- 0.5 dB) @ *+4dBu Input Sensitivity* +10 dBV (+/- 0.5 dB) @ *-10 dBV Input Sensitivity*
THD+N	< 0.005 %
Dynamic Range	> 105 dB

Analog Audio Outputs	
Output Type:	Balanced 3-pin line level
Output Impedance:	200 Ohms Balanced
Maximum output level:	+20 dBu (+/- 0.5 dB)
THD+N:	< 0.005 %
Dynamic Range:	> 105 dB

S/PDIF Audio Inputs	
Supported Formats	S/PDIF (IEC-60598) 2 CH PCM, 24bit
Supported Sample Rates	44.1 kHz, 48 kHz, 88.2kHz, 96 kHz, 192 kHz
THD+N:	< 0.005 %

S/PDIF Audio Output (Mirrors HDMI Input Audio)	
Supported Formats	S/PDIF (IEC-60598) 2 CH PCM, 24bit Compressed Multi-channel in Pass Through mode
Supported Sample Rates	44.1 kHz, 48 kHz, 88.2kHz, 96 kHz, 192 kHz
THD+N:	< 0.005 %

HDMI Audio Inputs	
Supported Formats	2 CH PCM, 24bit
Supported Sample Rates	44.1 kHz, 48 kHz, 88.2kHz, 96 kHz, 192 kHz
THD+N:	< 0.005 %

HDMI Audio Output	
Supported Formats	2 CH PCM, 24bit Compressed Multi-channel in Pass Through mode
Supported Sample Rates	44.1 kHz, 48 kHz, 88.2kHz, 96 kHz, 192 kHz
THD+N:	< 0.005 %

Video Specifications	
HDCP	V2.2
HDMI	V2.0
Supported Resolutions	4096×2160p@23.98,24/25/29.97,30/50/59.97,60Hz, 3840×2160p@23.98,24/25/29.97,30/50/59.97,60Hz (UHD), 2048x1080p,1080p@23.98/24/25/29.97/30/50/59.94/60Hz, 1080i@50/59.94/60Hz, 720p@50/59.94/60Hz, 576p, 576i, 480p, 480i 3D Support
Color Space	YUV, RGB
Chroma Subsampling	4:4:4, 4:2:2, 4:2:0
Max Color Depth	48 bit
EDID	SW Configurable
Hot Plug Detect	SW Configurable
Bandwidth	18 Gbps (600 MHz)
Connectors	HDMI Type A

Dante Network	
Physical Layer	Ethernet
Connector:	Single RJ-45
Cable Quality:	CAT-5e or better
Transmission Speed:	100 Mbps
Supported Sample Rates	48kHz
Minimum Dante Network Latency	1ms

Power Requirements	
PoE	802.3af PoE PD compliant
Power Consumption	< 7.6W Max
Cable Quality:	CAT-5e or better

Physical Dimensions	
Width	9.19"
Height	1.06"
Depth	4.0"
Weight	1.3lbs

Product Compliance
FCC CFR 47 Parts 15B Class A, EN55011
ICES-003
CE (EN55022 / EN55024)
RoHS
REACH