Hono AVB Custom

MODULAR AVB 1U INTERFACE

1 DESCRIPTION

The Hono AVB Custom is an AVB audio interface in a 1U rack mount format providing up to 32 channels of AVB receive and transmit.

The unit can be populated with up to four function specific modules, allowing up to 16 channels of analog or AES/EBU I/O. Each module has an interchangeable connector that may be configured with either a pluggable terminal block, StudioHub+® RJ-45, or a 50pin Centronics connector with XLR breakout cables.

The AVB Custom features a powerful Texas Instruments 32bit floating point DSP that allows sophisticated switching/mixing. A graphics display on the unit's front panel shows peak meters and status.

AudioScience provides application software that may be used to set up the AVB Custom. ASIControl sets up all internal features of the unit. 3rd party software allows AVB routing connections to be set up between the unit and any other AVB device on the network.

• FEATURES

- 4 AVB transmit and 4 AVB receive streams.
- Stream formats of 1,2,4,8,16 and 32 channels.
- 1U rack-mount unit.
- Modular architecture allows up to 4 I/O modules to be inserted into the back of the unit.
- Module connector options include Terminal Block (Phoenix style), StudioHub+® RJ-45, or 50pin Centronics connector with XLR breakout cables.
- Available modules include eight-channel analog I/O and eight channel AES/EBU I/O, 8 channel mic preamp and 16x16 GPIO.
- Powerful floating point DSP provides metering, level control and up to 20 dB gain on all signal paths.
- Interoperable with all AudioScience AVB Sound Cards and other third party AVB equipment.
- Supports CRF and AAF 32/24 formats
- Supports AVnu ProAV 1.1 and Milan standards
- Built-in 90-260VAC power supply

2 MODULE INFORMATION

For ordering, the AVB Custom model number is formatted to include the module(s), connector(s), and placement(s) of them within the unit: ASI2620-XXXX-YYYY (X=module, Y= connector). See also the "Modules and Audio Connections" section.

Module		Input/Output Type	Inputs	Outputs	Connector Type	
Name	X =				Name	Y =
ASI1431	1	Balanced analog	8	8	ASI1491 (50 pin Cent+cable) ASI1492 (StudioHub+ RJ-45) ASI1493 (Terminal block) ASI1491 (50 pin Cent-no cable)	2 3 1 5
ASI1433	3	Balanced analog	0	8		
ASI1441	4	AES/EBU	8	8		
ASI1442	5	AES/EBU	8	0		
ASI1443	6	AES/EBU	0	8		
ASI1432	2	Balanced analog	8	0	ASI1491 (50 pin Centronics) ASI1492 (StudioHub+ RJ-45) ASI1493 (Terminal block) ASI1494 (1/4" TRS)	2 3 1 4
ASI1462	8	Mic/Line	8	0		
ASI1451	7	GPIO Optos/Relays	16	16	ASI1493 (Terminal block)	1

3 SPECIFICATIONS

AVB INPUT/OUTPUT	
Type	100/1000Mb Ethernet
Connector	RJ-45
Streams	Four input and four output, Media clock stream input and output
Stream formats	IEEE 1722-2011/IEC 61883-6/AM824/MBLA mono channel PCM IEEE 1722-2011/IEC 61883-6/AM824/MBLA stereo channel PCM IEEE 1722-2011/IEC 61883-6/AM824/MBLA four channel PCM IEEE 1722-2011/IEC 61883-6/AM824/MBLA eight channel PCM
Sample Rate	48kHz, 96kHz
Latency	100us to 2ms
Control Protocol	IEEE1722.1-2013 and AudioScience HPI
ANALOG INPUT/OUTPUT	
Type	Balanced
Input Level	-10 to +24dBu in 1dBu steps
Input Impedance	10K ohms
A/D converter	24bit over sampling
Output Level	-10 to +24dBu in 1dBu steps
D/A converter	24bit over sampling
Load Impedance	600ohms or greater
Dynamic Range [1]	>105dB (input or output)
THD+N [2]	<0.0015% (input or output)
Sample Rates	48 kHz
Frequency Response	20Hz to 20kHz +0.1/-0.3dB
Connectors	3.81mm Terminal Block, 50pin Centronics type with XLR breakout cables or StudioHub+ compatible RJ45.
AES/EBU INPUT/OUTPUT	
Type	AES/EBU (EIAJ CP-340 Type I / IEC-958 Professional)
Sample Rates	Input: 32, 44.1, 48 and 96kHz - uses sample rate converter to convert Output: 32, 44.1, 48 and 96kHz selectable from any input.
Dynamic Range [1]	140dB, any input to any output
THD+N [3]	135dB, any input to any output
Connectors	3.81mm Terminal Block, 50pin Centronics type with XLR breakout cables or StudioHub+ compatible RJ45.
LATENCY (48kHz AVB)	
Analog input across network to Analog out	2ms[4] + 2ms network latency[5] = 4ms @ 48kHz sample rate
Analog input to Analog output	2ms @ 48kHz sample rate
SYSTEM REQUIREMENTS	
Network switch	AVnu certified network switch with AVB support. Compatible switches are: Extreme X430, X440 and x460 switches with AVB license installed and firmware v15.5.3.4 or greater.
Firmware	Firmware v1.0.2 and later require AudioScience Hono AVB Controller version 1.4.45 or later. When upgrading to v1.0.2 all internally stored configuration settings will be removed.
GENERAL	
Dimensions	1 RU, 19”(482mm) W x 8”(203mm) L x 1.75”(44mm) H
Weight	7 lb (3.2kg) max, with 16 analog inputs/outputs and terminal block connectors
Operating Temperature	0C to 60C
Power Requirements	100-240VAC, 47-63Hz, 25W max.
Certifications	CE/FCC with addition of ferrites (Fair-Rite model 0461176451 or equivalent) to audio cables

NOTES
[1] – Dynamic Range measured using a –60dB 1kHz sine wave and A weighting
[2] - THD+N measured using a +20dBu 1kHz sine wave sampled at 48kHz, 22-22kHz b/w and A weighting filter
[3] - THD+N measured using a –1dBFs 1kHz sine wave sampled at 48kHz, 22-22kHz b/w and A weighting filter
[4] – using firmware 1.0.2 or greater
[5] - Network latency is changeable using the Hono AVB Controller

4 REVISIONS

Date	Description
5 June 2015	1st Draft
22 October 2015	Updates and corrections
13 January 2016	Updates to front panel info
12 September 2016	Updated to include Hono AVB Controller
16 March 2017	Update to stream configuration info
30 March 2017	Added macOS info
30 May 2017	Added IP address recovery section to troubleshooting
26 September 2017	Update to features and firmware
10 October 2017	Updated screen shots of display
9 May 2018	Updated connector option in table on page 1
9 July 2019	Added AVB profile mode info
5 Nov 2020	Expanded AVB clock section

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6 IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Head 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 a third grounding prong. The wide 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 plug ends, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personal. 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.

This symbol is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to humans

This symbol is intended to alert the users to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

CAUTION: To reduce the risk of electric shock, do not remove the cover. No user-serviceable parts inside.

WARNING:

1. To prevent fire or electric shock, do not expose this apparatus to rain or moisture.

2. This apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as a vase, shall be placed on the apparatus.

3. This is a Class 1 apparatus, and as such must be connected to a mains socket outlet with a protective earthing connection.

4. The mains plug is used as the disconnect device and shall remain readily operable.

7 NOTICES

FEDERAL COMMUNICATIONS COMMISSION (FCC) INFORMATION

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. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. 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 his or her own expense.

8 ARCHITECTS & ENGINEERS SPECIFICATION

The AVB Audio Interface (interface) shall be available in various I/O configurations. Inputs/outputs shall be specified in channels in multiples of 8, up to a total of 32. Plug-in module options shall include analog input/output (ASI1431), analog input (ASI1432), analog output (ASI1433), AES/EBU input/output (ASI1441), AES/EBU input (ASI1442), AES/EBU output (ASI1443) and GPIO (ASI1451). The system shall support up to 4 plug-in modules. Analog inputs and outputs shall use 24-bit A/D and D/A and have adjustable level control. AES/EBU inputs and outputs shall have hardware sample rate converters. AES/EBU outputs shall support clocking from the AVB media clock, any AES/EBU input or from an internal sample clock running at any of the following rates 32, 44.1, 48, 64, 88.2, 96 kHz. Module connection options shall include XLR and Phoenix style terminal blocks.

IEEE 802.1 AVB standards shall transport digital audio over Ethernet, allowing multiple units to share digital audio. The IEEE 1722 and 1722.1 protocols shall be used, supporting integration with any third party AVB system or device. Multiple unit installations shall require an external AVB Ethernet bridge. All Ethernet connections shall be via CAT5/5e/6 cable or fiber-optic.

Each interface configuration shall include a 32-bit floating point DSP and all internal audio processing shall be performed digitally in floating point format. The front panel of the system shall support displaying level meters for all audio inputs and outputs (including AVB audio channels), IP address, MAC address and module information.

Software shall be provided for configuring each system remotely across the network. Software shall operate on a computer, with a network card installed. Source code and programming information for controlling the system remotely shall be available to integrators upon request.

The AVB Audio Interface shall be CE, FCC marked, and shall incorporate AES48-2005 Grounding and EMC best practices. The AVB Audio Interface shall be compliant with EU Directive 2002/95/EC, the RoHS directive. Warranty shall be 3 years.

The AVB Audio Interface shall be the Hono AVB Custom.

9 CERTIFICATIONS

CE/FCC: In order for the unit to comply with CE/FCC emissions requirements, you must add ferrites (Fair-Rite model 0461176451 or equivalent) to each of the I/O cables at a location as close as possible to the main cable connector on the back of the unit.

10 INTRODUCTION

The Hono AVB Custom is an AVB™ audio interface in a 1U rack mount format providing 32 channels of AVB receive and transmit.

The unit can be populated with up to four function specific modules, allowing up to 32 channels of analog or AES/EBU I/O. Each module has an interchangeable connector that may be configured with either a pluggable terminal block, a StudioHub+® RJ-45, or a 50pin Centronics connector with XLR breakout cables

The Hono AVB Custom features a powerful Texas Instruments 32bit floating point DSP that allows sophisticated switching and mixing. A graphics display on the unit's front panel shows peak meters and AVB status.

AudioScience provides application software that may be used to set up the Hono AVB Custom. ASIControl sets up all internal features of the unit such as levels and internal mixing/routing.

There are many combinations Hono AVB Custom plus modules available. The most common subset is listed below:

ASI2620-1100-1100	16 channels of balanced analog in/out. Terminal block connectors
ASI2620-1111-1111	32 channels of balanced analog in/out. Terminal block connectors
ASI2620-4400-2200	8 AES/EBU in/out (8 channels in/out). XLR connectors on breakout cable.
ASI2620-4444-2222	16 AES/EBU in/out (16 channels in/out). XLR connectors on breakout cable.

10.1 About IEEE AVB

Audio Video Bridging (AVB) is a set of next generation standards that have been developed by the IEEE. Their aim is to foster worry free Audio/Video (A/V) transport over standard Ethernet networks. AVB currently comprises seven standards.
These are:

IEEE 802.1AS: Timing and Synchronization for Time-Sensitive Applications (gPTP)
AVB relies on an accurate network wide timebase to guarantee media streams from distributed devices can be accurately synchronized. The 802.1AS standard is an extension of the established IEEE0355v1 protocol and was developed to provide the required high performance timing. IEEE 802.1Qav: Stream Reservation Protocol Methods for reserving bridge bandwidth are also completely specified and standardized using the IEEE 5/1.0Qav standard.

IEEE 801.2Qav: Forwarding and Queuing for Time-SensitiveStreams (FQTSS)
5/1.0Qav works by building guaranteed quality of service for AVB streams into the switches (which are now called bridges) and AVB devices so that regular network data, such as file transfers, can no longer cause glitches and dropouts for media flowing over the LAN.

IEEE 1722: Layer 2 Transport Protocol for Time Sensitive Applications in a Bridged Local Area Network
Standardized media formats within network packets are defined using the IEEE 1722 standard to guarantee interoperability between manufacturers.

IEEE 1722.1: Device Discovery, Enumeration, Connection Management and Control Protocol for 1722-Based Devices
AVB media streams cannot be said to inter-operate without a standardized method to discover devices and control the flow of media streams between them. This functionality is defined by the IEEE 1722.1 standard, which additionally can allow configuration and control of a device's functionality.

IEEE 802.1BA: Audio Video Bridging Systems
5/1.0BA specifies the default configuration for AVB devices in a network, which allows the detection of what parts of a network are AVB capable and what are not.

10.2 About the AVnu Alliance

Having a set of standards is one thing. Making sure everybody implements them correctly is another. That's where the AVnu Alliance comes in. The AVnu Alliance is an industry consortium dedicated to the advancement of professional quality A/V by promoting the adoption of the IEEE 5/1.0 Audio Video Bridging (AVB), and the related IEEE 1722 and IEEE 1722.1, standards.

The organization has created compliance test procedures and processes that ensure AVB interoperability of networked A/V devices. AudioScience is a member of AVnu and will be certifying all its AVB products through them to ensure the highest degree of conformance to the IEEE AVB standards.

For more information on the AVnu Alliance, please see www.avnu.org

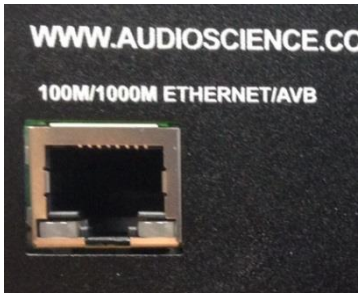
11 HARDWARE INSTALLATION

11.1 Rack Mounting

The Hono AVB Custom is 1 RU (1 rack unit/space) high and mounts in a standard 19-inch equipment rack.

- Use four mounting screws to fasten the front panel of the Hono AVB Custom to the 19-inch rack rails.
- Support any cables that are attached to the back of the Hono AVB Custom so that their weight does not put undue stress on the Hono AVB Custom's connectors.
- **The Hono AVB Custom has cooling vents on the side of the unit. Be careful not to obstruct these.**

11.2 Ethernet Connection



There is one RJ-45 Ethernet jacks on the rear of the Hono AVB Custom. A CAT-6 or better network cable is required for 1000baseT Ethernet operation. The cable length between the Hono AVB Custom and a network switch should not exceed 100 meters (328 feet)

11.3 AC Power

The detachable AC power cord that comes with the Hono AVB Custom plugs into the IEC connector on the chassis.

The Hono AVB Custom operates with AC voltages from 90 to 260VAC, 47 to 63Hz. No selection of voltage or frequency is required, the Hono AVB Custom's power supply will automatically adjust.

Use only an AC power source with a protective earth ground.

The Hono AVB Custom has no power switch. Detach the AC power cord to remove power to the Hono AVB Custom.

11.4 Modules and Audio Connections

The Hono AVB Custom extended model number indicates the module(s) and where they are placed in the Hono AVB Custom, as well as the connector(s) and where they are placed in the Hono AVB Custom (connected to the modules). The extended model number has the following format, where X=module and Y= connector: Hono AVB Custom-XXXX-YYYY. A 0 indicates empty slots/connectors.

For example, if purchasing an ASI1441 with connector ASI1492 for slot 1, the extended model number would be Hono AVB Custom-4000-3000.

11.4.1 Modules

The Hono AVB Custom will ship with ordered modules and connectors already installed. Should a module need to be changed in the field, it is easily done. Use an anti-static strap when handling the modules. Power down the Hono AVB Custom and remove the three, small screws that attach the module to the Hono AVB Custom (two on the bottom, one on top). Slide the module(s) out. Slide the module(s) in the desired slot(s), replace the three screws, and power up the Hono AVB Custom. The connector is removed from the module in the same way; slide the two components apart.

Note that when installing modules, always populate the back of the Hono AVB Custom from left to right, and do not leave any gaps.
Note that all configuration data will be reset to factory settings if modules are changed.

For Example, looking at the back of a Hono AVB Custom:

Correct:

ASI1443	ASI1443	ASI1431	<empty>	

Incorrect:

ASI1443	<empty>	ASI1431	<empty>	

There are eight different modules for the Hono AVB Custom:

Analog:
ASI1431 – 8 channels in/out
ASI1432 – 8 channels in
ASI1433 – 8 channels out

AES/EBU:
ASI1441 – 4 in/out (8 channels in/out)
ASI1442 – 4 in (8 channels in)
ASI1443 – 4 out (8 channels out)

Other:
ASI1451 – GPIO, 16 Optos/16 Relays
ASI1462 – Mic/Line In, 8 channels in

For further information on the modules, datasheets for each one can be found here under Resources.

11.4.2 Connectors

The Hono AVB Custom modules support a range of interchangeable I/O connectors. A choice of 50pin Centronics (ASI1491), StudioHub+™ (ASI1492), Phoenix (terminal block) (ASI1493), and ASI1493 (¼" TRS) allows the module to adapt to a wide variety of interconnection schemes with minimal custom wiring.

The Hono AVB Custom will ship with the ordered connectors installed on the ordered modules. Should a connector need to be replaced in the field, remove the module as stated in the section above then grasp the module in one hand and the connector in the other and carefully slide the two pieces apart. Replace connectors as needed, and then slide the module/connector unit back in the Hono AVB Custom, as stated above.

ASI1491
50 pin Centronics

ASI1492
StudioHub+

ASI1493
Terminal Block

ASI1494
¼" TRS

For pinout information, refer to the rear label of the connector, or go to the Hono AVB Custom overview web page here and under Resources click on the specific module's datasheet.

12 OPERATION

12.1 Power up sequence

This section describes the Hono AVB Custom power up sequence.

12.1.1 AC Power

Connect AC power to the unit by attaching the power cord to the IEC connector on the rear of the Hono AVB Custom, as explained in section 12.4

12.1.2 AudioScience Firmware images

The Hono AVB Custom boots from a firmware image stored in flash memory. There are two independent firmware images stored in every Hono AVB Custom. The two images are named “factory” and “update”. The “factory” image is a reference image that is in place should a “bad” image be downloaded to the device. The “update” image is the image that can be updated in the field if required.

12.1.3 Firmware loading sequence

When first powered up, the Hono AVB Custom performs the following sequence:

1. Checks for a valid “update” firmware image.
2. Loads the update image and starts running it.
3. Loads any control settings that may have been stored to flash.

In the case where the “update” image is determined to be corrupt, the factory image is loaded.

NOTE: Firmware v1.0.2 and later require AudioScience Hono AVB Controller version 1.1.45 or later.
NOTE: When upgrading to v1.0.2 all internally stored configuration settings will be removed. We recommend you use ASIControl to save your configuration (Adapter->Configuration->Save) before updating the firmware, then restore it (Adapter->Configuration->Restore) when the update is done.

12.1.4 Loading the Rescue firmware image

The Hono AVB Custom can be forced to load the Rescue firmware image by depressing the **SELECT** button on front panel as power is applied to the device. Keep the button depressed while power is applied.

12.2 Front Panel OLED Display

The front panel OLED display shows status readings from the Hono AVB Custom. The **SELECT** button is pressed to move between pages.

12.2.1 Status bar

The top of each page will show the current “Status” of the unit:

This is the current page name.

This is the media clock status.  Will flash if no media clock stream is currently connected to the unit.  denotes the current media clock sample rate. 48=48kHz, 96=96kHz.  denotes the source of the media clock. Options include: M – Media clock input stream, Sn – Input stream n where n=1..number of input streams, I – Internal media clock, P – gPTP clock.

 This is the gPTP (802.1AS) status.  will flash if no gPTP source is present.  denotes whether the unit is a gPTP Slave (S) or Master (M).

 This is the Ethernet and IP address status.  Will be flashing if the unit no network IP address. Z denotes a ZeroConf or self-assigned IP address. D denotes a DHCP assigned address. S denotes a

Static IP address. The unit may have a ZeroConf and DHCP address simultaneously, but will use the DHCP address.  This indicates that the Ethernet link is valid. It will flash if no link is present. If a G is in the middle of the jack icon, then this indicates a Gigabit link, otherwise a 100Mb link.

 This is the last 4 digits of the unit's MAC address.

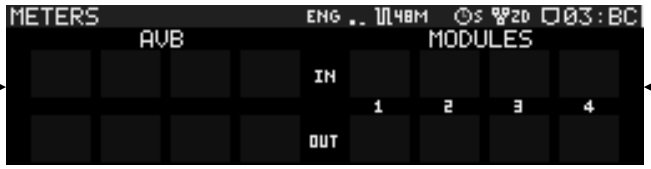
12.2.2 METERS

The default page shows meters for all 32 AVB input and output channels plus all 32 module inputs and outputs

Peak Meter features:

- Meters are shown for each AVB input and output channel
- Meters are shown for each Module input and output channel
- Meters are presented as groups of 8 channels
- Each meter has an overflow indicator, indicating a peak level of 0dBFs

AVB Stream Inputs and Outputs on the left.



Module Inputs and Outputs on the right.

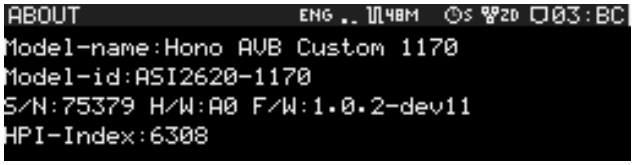
*Appear blank (1, 2 here) if no network connection

Hono AVB Custom METERS display

*For the Modules to show, an Ethernet cable must be plugged in and connected to the AVB network

12.2.3 ABOUT

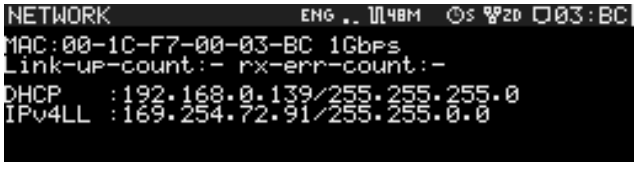
The ABOUT display shows information related to the model name, model ID , serial number, hardware and firmware revision.



Hono AVB Custom ABOUT display

12.2.4 NETWORK

The NETWORK page shows the Hono AVB Customs network MAC address and DHCP, IPv4LL (ZeroConf) and Static IP address. If no Static IP address is assigned then it is not shown



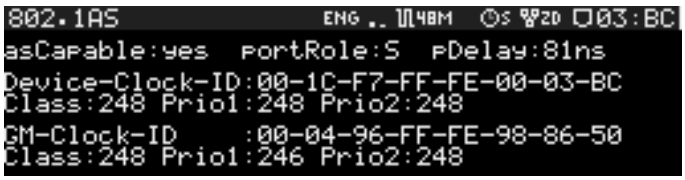
Line 1: MAC address
Line 2: Link up count, Receive error count
Line 3: DHCP/Static IP and Subnet
Line 4: IPv4LL(ZeroConf) IP and Subnet

Hono AVB Custom NETWORK display

12.2.5 802.1AS

The 802.1AS page shows various parameters related to the 802.1AS (gPTP) time synchronization protocol:

- asCapable – denotes whether the unit is connected to an AVB capable switch
- portRole – denotes whether the unit is a gPTP master (M) or slave (S)
- pDelay – the units estimation of the propagation delay between it and the switch in nanoseconds.
- Device-Clock-ID – gPTP ID of the device
- Class, Prio1, Prio2 - The gPTP Class, Priority1 and Priority2 values used in the Best Master Clock (BMC) algorithm
- GM-Clock-ID – gPTP ID of the gPTP current Grandmaster.



Hono AVB Custom 802.1AS display

13 SOFTWARE INSTALLATION

AudioScience makes audio adapters and drivers for various operating systems. Enhancements to an adapter's utility come from the integrators software that uses the audio driver to implement sophisticated audio playback and recording functions.

13.1 Drivers for Windows 10, 7, Server 2008, Server 2012

Typically, drivers are not included with the hardware and will need to be downloaded from the AudioScience website. They can be found here: http://www.audioscience.com/internet/download/win_drivers.htm

The first step is to determine what type of driver is needed for your operating system. Drivers are available for 32-bit and 64-bit Windows systems.

Driver 3.10 and later present the user with three install options during installation:

- Install Standard PCI/PCIe Driver.
- Install Standard + Network Audio Driver.
- Remove all driver components

Traditional installs should select the first of these options. Users of AudioScience CobraNet and AVB products should select the second option with the "+Network Audio Driver." in the text.

13.1.1 Combo Driver

The Combo driver installs WDM devices by default and presents an option to "Install legacy 32-bit WAVE driver" in case your application requires it. Download the file named ASICOMBO_xxxxxx.EXE from www.audioscience.com and run it (_xxxxxx is the version number). After the EXE has run, reboot your computer and the audio adapter will be operational. If the cover is off the computer, one can see one or two blinking LEDs on top of the card indicating its DSP is running and communicating with the driver.

Verify that the adapter is running using ASIControl (see ASIControl section in this document).

13.1.2 ASIO

All AudioScience drivers also install an ASIO driver interface. It is installed by default.

13.1.3 Driver Failure

In the event that an adapter's driver fails to load correctly, the OS's event viewer should be checked. The event log is accessed from the Administrative Tools applet in Windows Control Panel under Event Viewer. The Windows Logs\System view should be selected.

If two or more adapters are installed in the same system, the first thing to check is that the adapters were assigned unique adapter numbers. If issues persist, please email support@audioscience.com.

13.2 Drivers for Linux

The latest Linux driver can be downloaded from the AudioScience website – www.audioscience.com

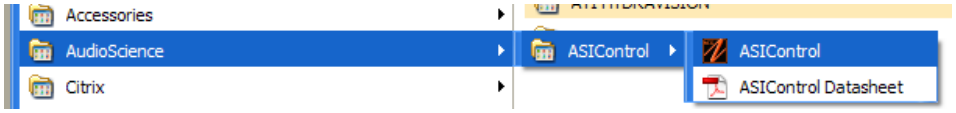
13.3 Applications for Windows

AudioScience provides ASIControl for adapter set-up and configuration.

13.3.1 ASIControl

All Windows drivers install an AudioScience application called ASIControl that can be used to setup and verify functionality of adapters. ASIControl provides a common interface for users across all driver types.

From the Windows Start menu, navigate to Start→Programs→AudioScience and run the ASIControl program.



14 APPLE MAC SOFTWARE INSTALLATION

14.1 Applications for Apple macOS

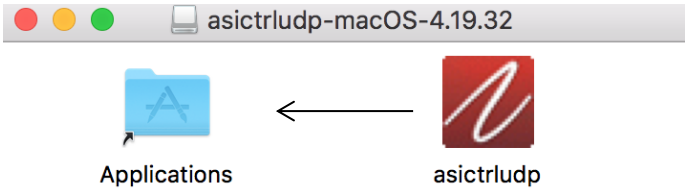
AudioScience provides ASIControlUDP for AVB configuration in the Apple macOS.

14.1.1 ASIControlUDP

Download the ASIControlUDP macOS installer from our website here:

http://www.audioscience.com/internet/download/apps.htm#ASIControlUDP

Double-click the DMG file and drag asictrludp to the Applications folder shortcut. After the application is dragged to the Applications folder, you can run it normally - from the Finder or Launchpad. Eject the DMG file by moving it to the Trash.



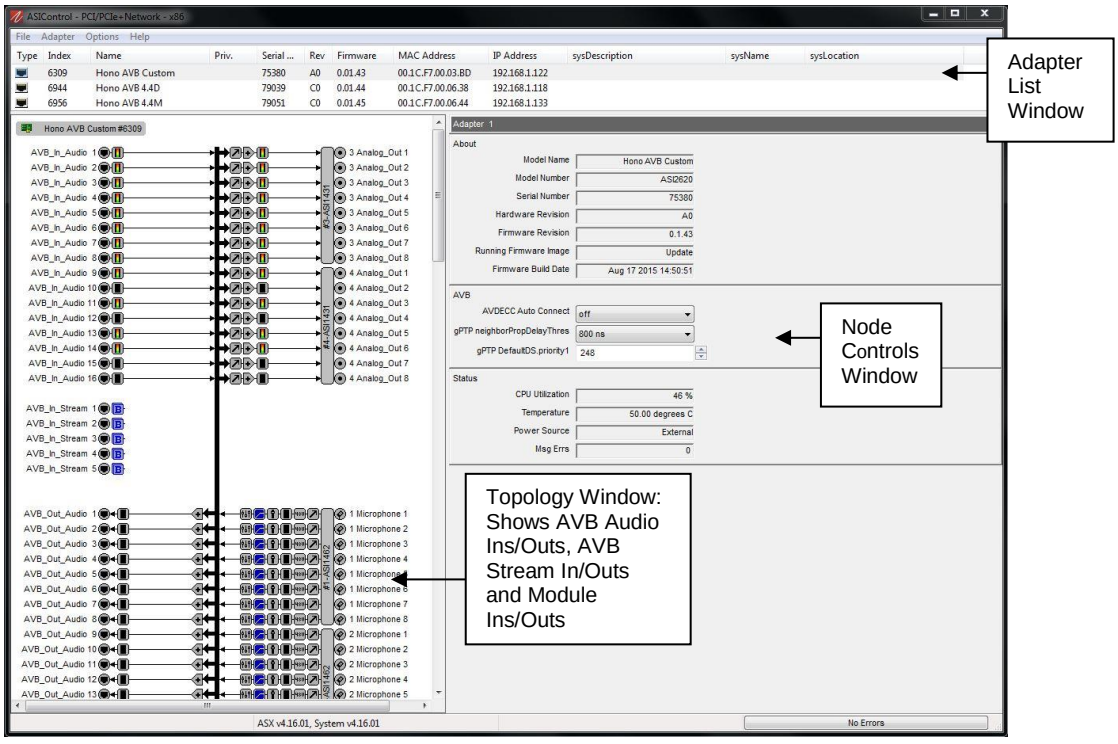
15 ASICONTROL CONFIGURATION

If there is more than one NIC in the computer, upon startup, ASIControl will first prompt the user for which network interface to use to communicate with AVB devices. Choose the NIC connected to the same switch as your other AVB devices.

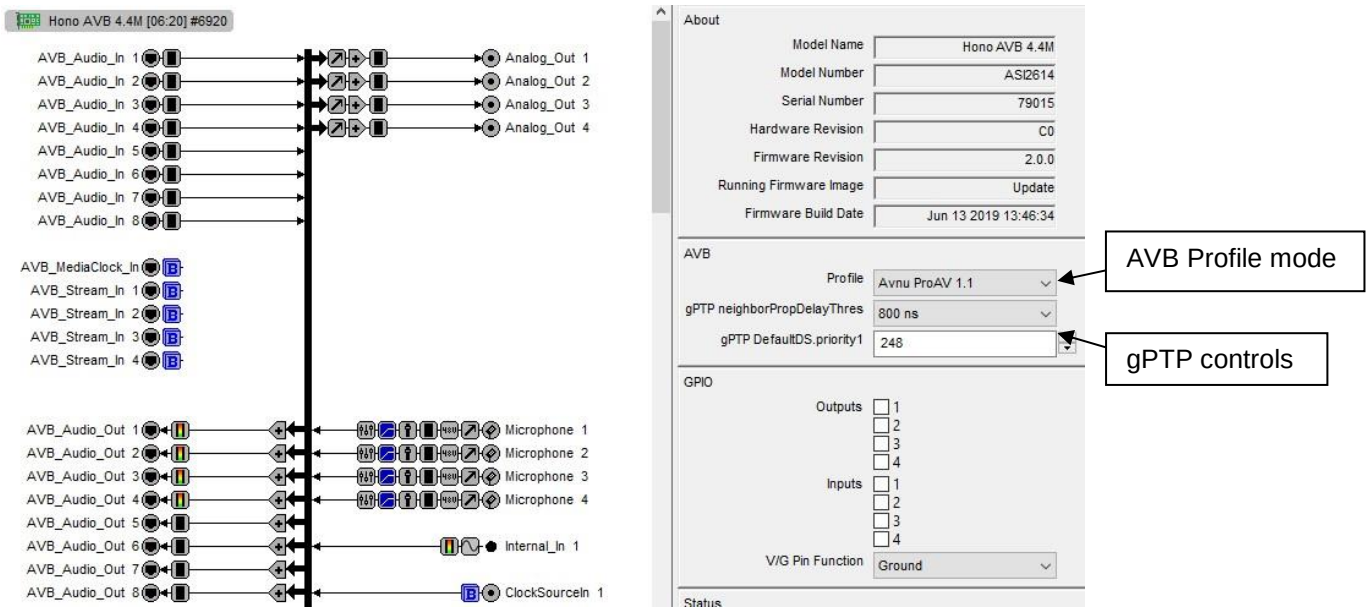
To preserve control changes made to the Hono AVB Custom, ASIControl must be shut down. This will save control settings to Hono AVB Custom's flash memory, allowing the settings to be restored after a power cycle.

16 OPERATION USING ASICONTROL

Using ASIControl, the Hono AVB Custom will look like so:



16.1 gPTP Configuration settings



neighborPropDelayThres:
The Hono AVB's port's AScapable flag is set to false when the measured pDelay to its neighbor exceeds a specified threshold. The can be set to either 800ns (default) or 4 s. For hardware units, after changing the value the "Status" LED on the front of the unit will flash while changes are saved. Do not reset the device while the "Status" LED is flashing or your changes will not be stored.

DefaultDS.priority1:
You can also set the DefaultDS.priority1 in this section (value range 0-255) For hardware units, changes to this value will also cause the "Status" LED to flash while changes are saved. Do not reset the device while the "Status" LED is flashing or your changes will not be stored. If you want the device to never be the grandmaster, set the priority field to 255. A reboot/restart will be required for this update to take effect.

16.2 AVB: Profile

Starting with firmware version 2.0.0, you can change the AVB Profile the unit will use to communicate with other AVB equipment. There are 2 options, the legacy Avnu ProAV 1.1 and the new Milan standard designed for greater interoperability between devices from different manufacturers. See the Milan website for more information: https://avnu.org/Milan/

16.2.1 Avnu ProAV 1.1

- Avnu certification level 1.1.
- Uses formats of type IEC61883-6_AM824
- Proprietary auto connect method

16.2.2 Milan

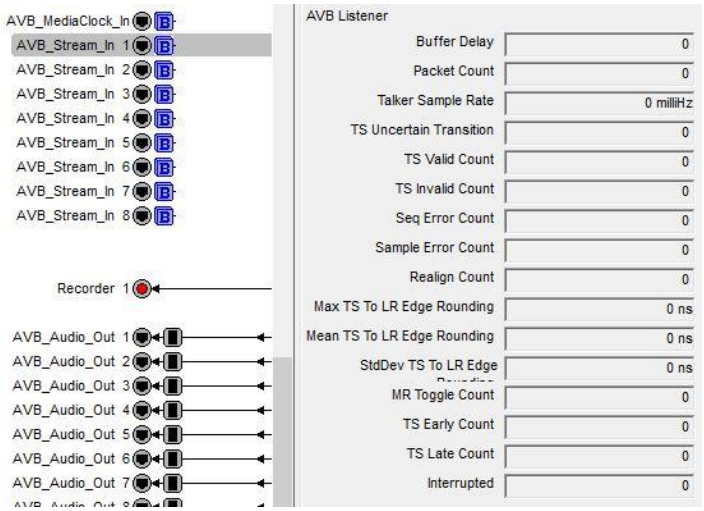
- AudioScience is not Milan certified at this time
- Uses formats of type AAF and CRF
- Implements many unsolicited responses
- Uses Milan listener connection state machine and Milan auto connect method

16.3 Auto Connect

Starting with firmware version 2.0.0, the unit will attempt to reconnect the streams that were active when power was lost. Prior versions offered a drop down option to enable/disable this feature.

16.4 AVB_In

Clicking on any available “AVB_Stream_In” will provide the following information as seen below.



*TS is an abbreviation for timestamp.

Buffer Delay

Packet Count
The number of 1722 packets received for this stream.

Talker Sample Rate

TS Uncertain Transition
The timestamp uncertain transition counter is incremented whenever timestamp uncertain field in the 1722 header transitions from false to true. Typically this indicates that the talker loses its PTP timebase for some reason.

TS Valid Count
This counts the number of 1722 packets received with the timestamp valid bit set. Under normal operation every 3 in 4 1722 packets will have the timestamp valid bit set.

TS Invalid Count
This counts the number of 1722 packets received with the timestamp valid bit not set. Under normal operation every 1 in 4 1722 packets will not have the timestamp valid bit set.

Seq Error Count
Every AVTP 1722 audio packet has a sequence number that increments every packet. The sequence error records any instances where examination of the sequence number indicates that it did not increment by one.

Sample Error Count
The sample error count increment for every 1722 IEC 61883 sample decoded that does not have 0x40 in the most significant byte.

Realign Count
When unpacking 1722 audio, the expectation is that the audio from every packet butts up exactly against the audio of the previous sample. This means that there are no overlaps or holes in the audio sample sequence. The realign count records the number of times that there was an overlap or gap during the packet unpack process. In normal operation this counter should remain zero.

Max/Mean/StdDev TS to LR Edge Rounding
These fields measure the delta between the embedded 802.1AS presentation timestamp and the L/R edge of the

Hono's media clock. When the Hono is listening to an AVTP 1722 audio stream, every packet with a valid timestamp is positioned in an output buffer according to its presentation time. The Hono "knows" the timestamps of its own media clock in relation to its audio output buffer. The rounding field is a measure of how much rounding occurs when determining which output "bin" to unpack the AVTP audio in to.

Under normal operation the StdDev should be less than 10ns. The expected mean depends on the implementation of the talker. Some talkers deliberately make their PTP timestamp in the middle of the sample time so that jitter is less likely to cause alignment to transition over a mediaclock edge. The most important thing is to look for the mean offset to remain stable. If is it incrementing or decrementing it indicates that the talker and listener mediaclocks are not locked.

17 AVB AUDIO ROUTING IN ASICONTROL

The following section describes how AVB routing and channel mappings work in AudioScience AVB products.

17.1 AVB Routing concepts and terminology

AVB input streams (Listener streams) are shown as AVB_Stream_In # in ASIControl. AudioScience supports streams formats of 1,2,4,8,16 and 32 channels. By default all AVB streams are set to 1 channel (mono).

AVB output streams (Talker streams) are shown as AVB_Stream_Out # in ASIControl. AudioScience supports streams formats of 1,2,4,8,16 and 32 channels. By default all AVB streams are set to 1 channel (mono).

IEEE 1722.1(AVDECC) mappings are used to define how audio channels within a stream are routed to the embedded mixer in the Hono AVB device. AVB_Audio_In nodes, which are all mono, are used as the mixer audio input nodes for AVB Input Streams (Listeners) audio. AVB_Audio_Out nodes, which are all mono, are used as the mixer audio output nodes for AVB Output Streams (Listeners) audio.

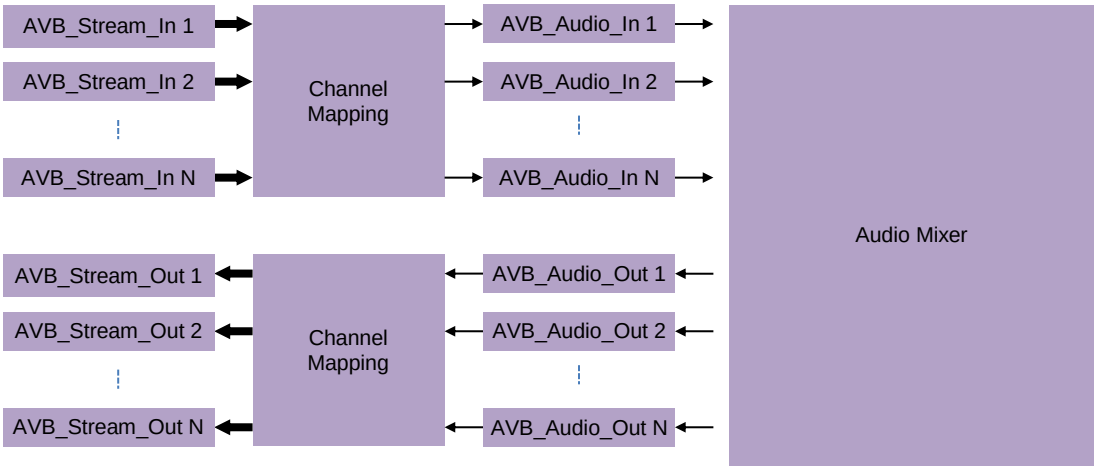


Figure 1. AVB Data flow

17.2 AVDECC configurations

Beginning with Hono AVB Endpoint firmware 1.0.0 and VSC build 4.19.30, two AVDECC configurations are supported. The configurations can be changed by the Configuration drop down in the AudioScience Hono AVB Controller. The first (default) configuration is labelled "Static" and consists of streams that do not have any configurable mappings. The second configuration is labelled "Dynamic" and supports user configurable mappings to route audio to and from the input and output streams.

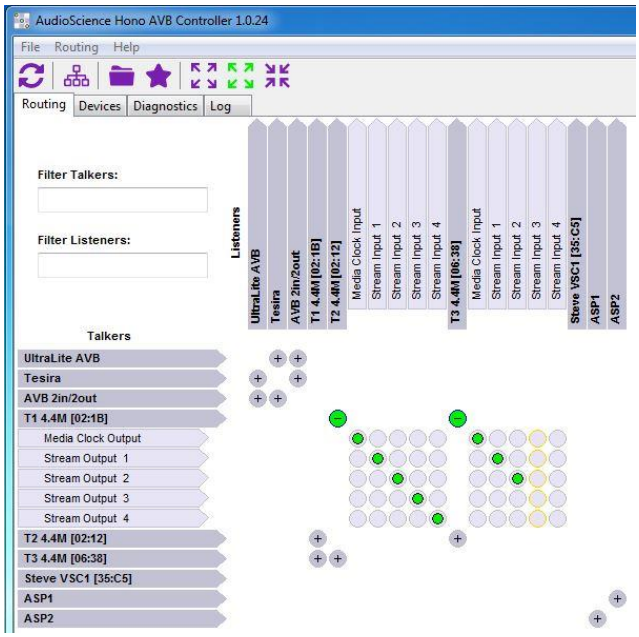
17.3 Launch AVB Controller

17.3.1 Windows

To access the mappings dialog, right click on an AVB adapter in the ASIControl adapter list and select "Launch Hono AVB Controller".

Figure 2. Launch Hono AVB Controller in ASIControl

This will launch a separate program that should have been installed with our driver and you will see the "AudioScience AVB Controller" as shown below.



For information on the AudioScience Hono AVB Controller, download the datasheet from our website here:

http://www.audioscience.com/internet/products/avb/datasheet_hono_avb_controller.pdf

18 AVB NETWORK SETUP

This section outlines the steps in setting up an AVB network using AudioScience AVB devices. Integrators who are familiar with AVB can skip this section. The following sections discuss gPTP setup and MediaClock configuration.

gPTP

gPTP is an implementation of IEEE802.1AS that supports propagating a common timebase across an Ethernet LAN. One of the gPTP clocks on the network becomes the master clock after negotiating with all the other gPTP peers.
In a typical plug-and-play environment, the AVnu certified switch will become the gPTP master and all other devices will slave off it. Unless an integrator wishes to explicitly assign a particular device to be the gPTP master (using priority1 gPTP settings), default settings will work fine.

MediaClock

In addition to the timebase, the MediaClock must be configured. The MediaClock controls the sample rate of the AVB device and should be thought of as the "Word Clock" from studio audio configurations. The integrator should decide up front which device is going to deliver MediaClock to all the AVB devices on the network. Typical configurations will use the separate MediaClock stream for connecting the MediaClock between devices.

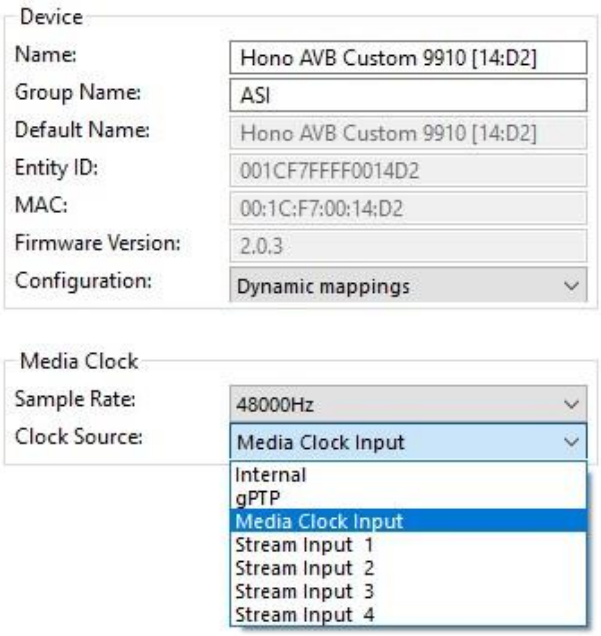
Optionally, if an AVB endstation is used only as a listener, one of the listener (Input Streams) can be configured to act as the MediaClock.

Under normal operation, the MediaClock would be connected before the audio streams are started so that the sample clock on the AVB device is running at the correct rate before audio is passed.

18.1 Setting MediaClock

Setting the MediaClock on your AudioScience device is done as part of establishing a connection between 2 units. There are different programs that can be used for establishing connections and device settings; this example uses the Hono AVB Controller from AudioScience to demonstrate the available options.

As you can see from the example below, AudioScience AVB devices offer several options for configuring the MediaClock. This is found under the “Device Config” tab in Hono AVB Controllller.



18.1.1 Media Clock Sample Rate

This sets the native sample rate of the hardware device. Options are 48000Hz and in some cases 96000Hz. Set this rate to match the other AVB equipment in your setup that you wish to connect too. These MUST match in an AVB setup or you will not be able to establish a connection.

18.1.2 Clock Source

The Clock Source is used to establish how this unit will sync to other devices in your network. The options are:

18.1.2.1 Internal

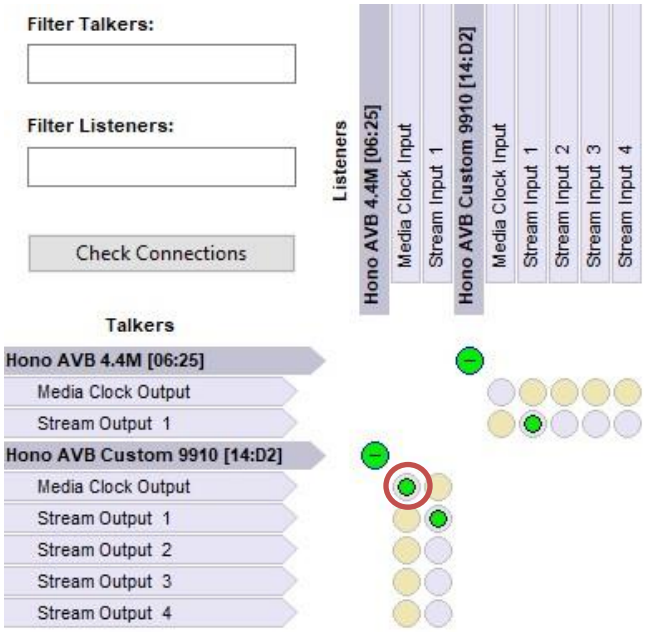
Internal means the unit will NOT sync to any other units but will run its own clock. Internal is usually used when the unit you are configuring is going to act as the MediaClock for other devices in your network.

18.1.2.2 gPTP

gPTP is strictly a debug setting and we do not recommend you use it during normal operation.

18.1.2.3 Media Clock Input

Media Clock Input is used to sync this device with another device on the network that has a distinct Media Clock Output. Not all AVB devices offer this option but AudioScience has included it in our AVB spec as an alternative to using Stream Inputs. It is important to remember that in order for this to work, you MUST also establish a specific channel connection between a Talker’s Media Clock Output and a Listener’s Media Clock Input as shown below.



In this example, the Hono AVB Custom 9910 has its Clock Source set to Internal (meaning it will be the master clock) and the Hono AVB 4.4M has its Clock Source set to Media Clock Input. Then a connection is established between the devices in the routing tab as shown in the red circle.

18.1.2.4 Stream Input 1 – 4

Stream Inputs 1 – 4 can be used to sync to devices that offer in-stream sync only. All AVB devices should offer this as an option. This sends a sync signal along with an AVB audio signal in the same stream. A connection must be established between the 2 units in order for them to sync. If you set this to Stream Input 2 but do not have connection between one of the Talker's Stream Outputs and the Listener's Stream Input 2 then you will not get a valid clocking source.

18.1.3 Media Clock issues

The most common indicators of MediaClock issues are audio glitches on the Listener devices. Double check the settings above to determine that you have created a valid Media Clock structure for your network.

19 AVB TROUBLESHOOTING

The following section lists some possible problem areas that should be checked before contacting AudioScience technical support.

19.1 Switch and Network issues

19.1.1 Switch requirements

If you are experiencing connection or transmission issues the first thing to check is your network switch. AudioScience AVB currently only supports the following switch hardware:

Extreme X430, X440 and X460 switches with AVB license installed

In addition to only supporting the models listed, you must have firmware v15.5.3.4 or greater installed in order for your switch to communicate with AudioScience AVB products.

19.2 IP Address recovery (hardware devices)

In the event your Hono AVB hardware device is set to an IP address that is inaccessible from your current PC it is possible to connect to the device using a self-assigned 169.xxx.xxx.xxx address. In order to be able to communicate with the unit at this address you will need to clear the IP address on your system's NIC and allow it to assign itself its own 169.xxx.xxx.xxx address (this address range is the default used by TCP/IP when no DHCP server can be found).

19.2.1 Windows

In Windows you can accomplish this with the following steps.

1. Open a Command Prompt.
2. Type "ipconfig" and press enter, this will display information for all the NICs in your system.
3. Type "ipconfig /release" and press enter, this will remove the current IP address from ALL network devices. (If you have many devices and do not wish to remove the IP address from all of them, run "ipconfig /?" for instructions on how to pick a specific adapter when running these commands)
4. Wait about 10 seconds or so and type "ipconfig" and press enter again. If the IP address has been cleared and reassigned your NIC should now have an IPv4 address starting with 169.
5. Open ASIControl and check to see if the unit you need is now accessible. If it is you should see an IP address listed for it in the 169.xxx.xxx.xxx range. You should now be able to right click the unit in the top pane of ASIControl and select "Change IP Address…" This will open up the unit's configuration page in a browser (Firefox, Chrome or IE) and will display the "IPv4 Configuration" window showing the standard IP address that is currently assigned to the unit (not the 169 address).
6. Either choose the "DHCP" option or enter a new IP address that is on the same subnet as your usual network address and click "Apply" The unit should reset with the new IP address.
7. You can now return to the Command Prompt window and type "ipconfig /renew" and your NIC should reset its address to an acceptable IP for your network. You can type "ipconfig" again to confirm it no longer has a 169 address.
8. Once your IP is reset to its usual range, open ASIControl again and check that you can now see the unit on the same network.

19.2.2 MAC

19.2.2.1 Method 1:

In order to configure a computer running OSX to connect to a local-link address follow these steps:

1. Go to "System Preferences" -> "Network",
2. Choose the network interface to modify (it will have a green dot indicating it is connected and in use), then click on the "Advanced" button and then the "TCP/IP" tab.

3. Make a note of the settings currently in use then select “Manual” from the configuration mode drop down box and fill in 169.254.1.1 as IPv4 address and 255.255.0.0 as subnet mask. Click “OK” and then “Apply”.
4. You will then need to determine what the 169.xxx.xxx.xxx address of your AVB device is. To do that you will need to install the MAC version of ASIControl available here: http://www.audioscience.com/internet/download/apps.htm
5. Open ASIControl and check to see if the unit you need is now accessible. If it is you should see an IP address listed for it in the 169.xxx.xxx.xxx range. You should now be able to right click the unit in the top pane of ASIControl and select “Change IP Address…” This will open up the unit’s configuration page in a browser (Firefox, Chrome or IE) and will display the “IPv4 Configuration” window showing the standard IP address that is currently assigned to the unit (not the 169 address).
6. Either choose the “DHCP” option or enter a new IP address that is on the same subnet as your usual network address and click “Apply” The unit should reset with the new IP address.
7. In order to return to the previous configuration repeat the process in steps 1-3 above and revert the settings to their previous values.

19.2.2.2 Method 2:

If you know the unit’s serial number you can also access it’s web browser with this method.

The OSX method uses ZeroConf/Bonjour to lookup up the device’s IP address.

Open a web browser and type **asi2614-73393.local** in the URL box (where 73393 would be replaced with the serial number of the target Hono AVB device).

<end>