

BRIDGE LIVE IP

SMPTE ST 2110 Video I/O and Streaming Appliance



Installation and Operation Guide

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Contacting AJA Technical Support or Sales

Please have all pertinent information at hand prior to contacting AJA support or sales.

Support Telephone: +1.530.271.3190

Support Website: <https://www.aja.com/support/contact>

Support Email: support@aja.com

Sales Email: sales@aja.com

Shipping Address: AJA Video Systems
180 Litton Drive
Grass Valley, CA 95945, USA

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Chapter 1 – Introduction

Overview

The BRIDGE LIVE IP product is a broadcast quality, low latency turnkey system for REMI, Synchronous Multi-Channel Video Contribution, Remote Collaboration, Direct to Audience Streaming, and Multi Bit Rate/Format Delivery for SMPTE ST 2110 (also referred to in this manual as ST 2110) environments.

NOTE: REMI is an acronym used in the broadcast industry for Remote Model Integration and is sometimes called "at home" production with a broadcast workflow where content is captured live at a remote location while production is performed at a main studio.

Equipped with multiple ST 2110 IP inputs/outputs plus the power and flexibility to enable real time bidirectional encoding, decoding, and transcoding for critical UltraHD and HD workflows, BRIDGE LIVE IP is an essential part of any modern live video production toolkit utilizing ST 2110. A compact and robust 1RU form factor with redundant power supplies and a 3 year warranty means peace of mind even when dealing with the most demanding applications.

Whether facilitating remote production, two-way interviews, live event streaming, synchronous multi-cam backhaul, cloud contribution, program return, confidence monitoring, collaborative production, or ABR ladder profiles to hand-off for OTT packaging, BRIDGE LIVE IP ensures simultaneous, secure, and stable workflows whether over private lines or the public internet.

For examples of BRIDGE LIVE IP workflow solutions, visit the BRIDGE LIVE IP product webpage (<https://www.aja.com/products/bridge-live-ip>).

Features

- BRIDGE LIVE IP:
 - Bi-directional multi-channel ST 2110-20 UHD (up to 4x channels) and HD (up to 16x channels)
 - ST 2110-30 audio support: up to 64 channels per stream at 48 or 96 kHz
 - ST 2110-40 Ancillary Transmit support: up to 12 stream
- Bidirectional Encode/Decode/Transcode Codecs: H.265 (HEVC), H.264 (AVC, MPEG-4), H.262 (MPEG-2), and with optional licenses NDI®, JPEG 2000 (TR-01), and JPEG XS (TR-07)*
- Synchronous Multi-Channel / Multi-System Transport for IP backhaul or Cloud Delivery
- Protocols: SRT, UDP, HLS, RTP, RTMP/S (output), MPTS (input)
- Transports: MPEG-TS, NDI, AVC-TS, Fragmented MP4 (input)
- Multiple NDI Discovery Server and NDI Groups support
- Multi bit rate/format distribution, ABR Ladder Profiles for OTT hand-off
- Selectable profiles for 8, 10, and 12-bit depth, 4:2:2 and 4:2:0 (depending on the codec)
- Unmatched Metadata capabilities including, ST 2110-40, MPEG-2 ANC, SMPTE 2038, Ad insertion markers (SCTE-35/SCTE-104), CC/Subtitles (EIA-608/708, Line 21, H.264 SEI)
- Hitless Redundancy via ST 2022-7 for ST 2110 and MPEG-TS as well as SRT Network Bonding
- Remote WebUI or local GUI for easy administration, control, and operation
- Monitoring, Control, and Automation supported via REST API or SNMP

- Turnkey 1RU rack-mountable, enterprise-class form factor
- Dual 10GigE interface for transport, compressed media, and out-of-band NMOS control.
- Dual 10/25GigE SFP cages for in-band NMOS control and ST 2110 transport**
- Dual power supplies for critical application redundancy
- Three year hardware warranty included. Option to extend hardware warranty to five years, with active Maintenance License

*NDI, JPEG 2000, and JPEG XS I/O options are available as purchasable licenses

** SFPs not included. See ["SFP Selection" on page 104](#) for details regarding SFP support.

Supported Encoding

BRIDGE LIVE IP supports JPEG2000, JPEGXS, H.262, H.264, H.265, and NDI. The video parameters must be exactly matched and it's not possible to use it at the same time with logo insertion or video correction. To configure this, you must set the output video bitrate to 0. Keep in mind that the Total bitrate must be higher than the real video bitrate otherwise frame drops will occur.

NOTE: You can only choose two different frame rate (fps) options on the output, i.e. the same as the source or halved in rate.

Metadata

BRIDGE LIVE IP allows the pass through of metadata, and supports various codecs, protocols, and transports:

- ST 2110-40 Tx
- MPEG-2 ancillary packet support, SMPTE ST 2038
- Ad insertion markers (SCTE-35/SCTE-104) pass through
- CEA-608/CEA-708 Closed Captioning
- Timecode
- Embedding Closed Captioning/Subtitles into H.264 SEI messages
- Metadata pass-through
- Electronic Program Guide (EPG) on input
- SEI (supplemental enhancement information) timecode insertion
- NDI HDR metadata Manual Marking

Encoding and Decoding Protocols Supported

BRIDGE LIVE IP supports encoding from ST 2110 to Compressed Streams, and decoding from Compressed Streams to ST 2110. Encoding and decoding between ST 2110, NDI, JPEG 2000 and JPEG XS streams is also fully supported with installation of optional licenses. Transcoding between any Compressed Stream input and Compressed Stream output is also supported. See the following tables for detailed signal specifications:

BRIDGE LIVE IP

For ST 2110 to Stream encoding see ["BRIDGE LIVE IP - ST 2110 Rx to Compressed Stream Encode" on page 10](#).

For Stream to ST 2110 encoding see ["BRIDGE LIVE IP - Compressed Stream Decode to ST 2110 Tx" on page 11](#).

NOTE: The table values are recommendations only. Bit rate value settings should consider available network throughput for each channel.

Table 1. BRIDGE LIVE IP - ST 2110 Rx to Compressed Stream Encode

Codec/Quality	HD (1080p)	UltraHD	Protocol	Transport	Metadata
NDI UYVY 4:2:2, 8-bit P216 4:2:2, 16-bit	8x up to 60p 16x up to 60i 105-165 Mbps	2x up to 60p 4x up to 30p 150-312 Mbps	NDI	NDI	
H.265 (HEVC) 4:2:0, 8-bit	8x 60p, 8mbps	2x up to 60p 4x up to 30p 60 Mbps	RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC) Encoding: SCTE-104 to SCTE-35 conversion
H.265 (HEVC) 4:2:0, 10-bit	8x up to 60p 8 Mbps	1x up to 60p 4x up to 30p 60 Mbps	RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC) Encoding: SCTE-104 to SCTE-35 conversion
H.264 (AVC) 4:2:0, 8-bit	8x up to 60p 16x up to 60i 15 Mbps	2x up to 60p 4x up to 30p 60 Mbps	HLS RTP RTMP/S SRT UDP	HLS RTP RTMP/S SRT UDP	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC) Encoding: SCTE-104 to SCTE-35 conversion Subtitles embedded within H.264 SEI messages
H.264 (AVC) 4:2:2, 10-bit	8x up to 30p 6x up to 60p 75 Mbps	2x up to 60p 3x up to 30p 110 Mbps	HLS RTP RTMP/S SRT UDP	AVC-TS MPEG-TS MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC). Supporting SDR/HDR Transfer Characteristics, Colorimetry and Luminance Encoding: SCTE-104 to SCTE-35 conversion Subtitles embedded within H.264 SEI messages
H.262 (MPEG2) 4:2:0, 8-bit	8x up to 30p/60i 15 Mbps		RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	MPEG-TS MPEG-TS MPEG-TS
JPEG 2000 TR-01 4:2:2, 10-bit	5x up to 60p 220 Mbps	2x up to 60p 4x up to 30p 800 Mbps	RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC). Supporting SDR/HDR Transfer Characteristics, Colorimetry and Luminance Encoding: SCTE-104 to SCTE-35 conversion
JPEG XS 4:2:2 10-bit	8x up to 60p 210Mbps	2x up to 60p 4x up to 30p 420 Mbps	RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC). Supporting SDR/HDR Transfer Characteristics, Colorimetry and Luminance Encoding: SCTE-104 to SCTE-35 conversion

Table 2. BRIDGE LIVE IP - Compressed Stream Decode to ST 2110 Tx

Codec/Quality	HD (1080p)	UltraHD	Protocol	Transport	Metadata
NDI UYVY 4:2:2, 8-bit P216 4:2:2, 16-bit	8x up to 60p 16x up to 60i 105-165 Mbps	2x up to 60p 4x up to 30p 150-312 Mbps	NDI	NDI	
NDI HX (1, 2, 3) 4:2:0, 8-bit	8x 720p		NDI HX	NDI	
H.265 (HEVC) 4:2:0, 8-bit	8x up to 60p 12x up to 60i 8 Mbps	2x up to 60p 4x up to 30p 35 Mbps	RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC)
H.265 (HEVC) 4:2:0, 10-bit	4x up to 60p 8 Mbps	2x up to 60p 4x up to 30p 35 Mbps	RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC)
H.264 (AVC) 4:2:0, 8-bit	8x up to 60p 8 Mbps	2x up to 60p 4x up to 30p 40 Mbps	HLS RTP RTMP/S SRT UDP	Fragmented MP4, AVC-TS MPEG-TS MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC)
H.264 (AVC) 4:2:2, 10-bit	8x up to 30p 4x up to 60p 50 Mbps	2x up to 60p 4x up to 30p 60 Mbps	HLS RTP SRT UDP	Fragmented MP4, AVC-TS MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC). Supporting SDR/HDR Transfer Characteristics, Colorimetry and Luminance
H.262 (MPEG2) 4:2:0, 8-bit	8x up to 30p/60i 8 Mbps		RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC)
JPEG 2000 TR-01 4:2:2, 10-bit	8x up to 60p 160 Mbps	2x up to 60p 4x up to 30p 160 Mbps	RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC). Supporting SDR/HDR Transfer Characteristics, Colorimetry and Luminance
JPEG XS 4:2:2 10-bit	8x up to 60p 210Mbps	2x up to 60p 4x up to 30p 420 Mbps	RTP SRT UDP	MPEG-TS MPEG-TS MPEG-TS	End-to-End: Generic SDI VANC metadata via SMPTE 2038 ANC (MPEG-2 ANC). Supporting SDR/HDR Transfer Characteristics, Colorimetry and Luminance

Hardware Description

Chassis Front

Figure 1. BRIDGE LIVE IP Chassis Front View

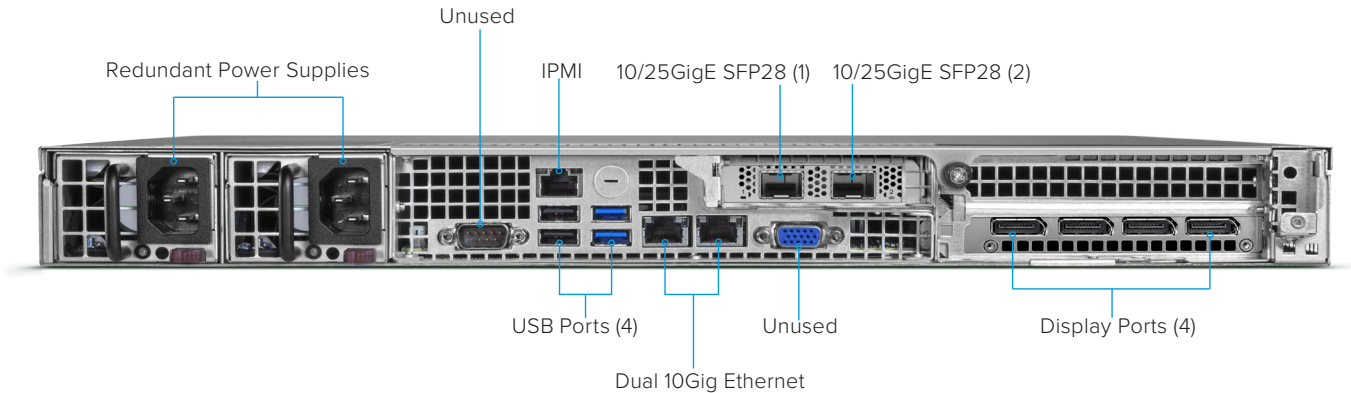


Chassis Power Button

The main power switch is used to apply or remove power from the power supply to the system. Turning off system power with this button removes the main power but keeps standby power supplied to the system. Therefore, you must unplug all system power cords before servicing.

Chassis Rear

Figure 2. BRIDGE LIVE IP Chassis Rear View



BRIDGE LIVE IP devices are equipped with:

- Two Redundant Power Supplies (IEC connectors)
- Two USB 3.0 (blue) connectors
- Two USB 2.0 (black) connectors
- Two 10GigE RJ-45 Ethernet connectors
- Two SFP28 cages supporting 10GigE and 25GigE SFPs for ST 2022-7 redundancy
- Display Ports for use with monitors
- One IPMI (Intelligent Platform Management Interface) RJ-45 connector

Rear Panel Power Supply LEDs

On the rear of each power supply module an LED indicates its status as follows.

- Solid Green: When illuminated, indicates that the power supply is on
- Solid Amber: When illuminated, indicates the power supply is plugged in and turned off, or the system is off but in an abnormal state
- Blinking Amber: When blinking, this system power supply temperature has reached 63°C. The system will automatically power-down when the power supply temperature reaches 70°C and restarts when the power supply temperature goes below 60°C

Synchronous Multi-Channel Guidelines

The default encoding configurations should be suitable for most use cases. However, when configuring synchronous multi-channel transport, the following four key areas warrant careful consideration:

- Genlocking
- Encoding Guidelines
- Decoding Guidelines
- Audio Best Practices

Genlocking

ST 2110 requires PTPv2 as the genlock clock and is supported on the SFP media interfaces.

BRIDGE LIVE IP must be locked to PTP within the same PTP domain as the ST 2110 source origin.

ST 2110 Output TX is locked to PTP.

Encoding Guidelines

Encode the IP inputs using MPEG-TS.

Use equal parameters for all IP inputs. Do not modify any video parameters such as scan type, resolution, or frame rate.

To simplify this process of using equal parameters, you can use the "Clone" button to replicate the configuration on a single encoder. Use the "Download" and "Upload a preset" buttons to replicate the configuration over multiple encoders.

Synchronization when encoding to MPEG-TS

The output video parameters must be consistent across all outputs. Do not modify any video parameters such as scan type, resolution, or frame rate between outputs.

To simplify this process of using consistent parameters, you can use the "Clone" button to replicate the configuration on a single encoder. Note that the "Download" and "Upload a preset" buttons cannot be used to replicate configuration across multiple encoders, as the ST 2110 input is dependent on the NMOS SDP.

Use the RTP network protocol for transport on reliable networks such as within a single facility. Use the SRT network protocol for transport over less reliable networks where packet loss may be expected.

The output of every encoding pipeline must be routed to a unique address and port destination.

You can tune the encoding configuration to achieve your desired quality. For example, you could choose to encode using the visually lossless codec JPEG XS or 2000.

Before configuring the encoder, you must first use NMOS IS-05 to receive the SDP file. The input video parameters are detected automatically from the SDP.

Decoding Guidelines

Decoders are configured to receive traffic originating from encoders and to straightforwardly decode to ST 2110 without modifying any video parameters such as scan type, resolution, or frame rate.

When decoding using the SRT network protocol, you may need to tune SRT latency to meet the requirements of the network unreliability.

Configure all decoding pipelines to equal SRT latency. This field is present in the BRIDGE LIVE IP User Interface on the main page. If you see packet drops, there could be an issue with SRT. Increasing the latency should help. Be careful to set up the same latency in each pipeline. Refer to the pipeline configuration on the Source side.

Audio Best Practices

An ST 2110-30 receiver can receive up to 64 channels of audio each. Mapping can be done using the audio mapping on the output. For Audio, best practice is to add primary audio via a single pipeline (up to 16 channels). This may require some routing or premixing upstream of BRIDGE LIVE IP (Tx).

Audio can be carried via all pipelines. However, in some circumstances, it is possible for one or more pipelines to get up to 1 frame late. In this scenario, the audio transported across each pipeline remains good; however, if switching live between the IP outputs from the BRIDGE LIVE IP (Tx), then some audio clicks and pops may occur.

Chapter 2 – Installation

Overview

BRIDGE LIVE IP ships from the factory with the latest version of software installed.

What's In the Box?

- BRIDGE LIVE IP Quick Start Guide
- BRIDGE LIVE IP appliance, including:
 - pre-installed rack-ears
 - rack rails
 - two power cables

Quick Start Guide Login Credentials

BRIDGE LIVE IP ships with a Quick Start Guide when it comes from the factory. This physical document contains the login information for accessing BRIDGE LIVE IP for the first time. Do not discard the unique Quick Start Guide, as these credentials will be required following any future Factory Reset. If you do not have this Quick Start Guide, you will need to contact AJA tech support.

If you are receiving a system that has been used elsewhere and you do not have the password that may have been applied, you can perform a Factory Reset and then use the factory supplied password from the Quick Start Guide to regain access to the system for set up.

Installation Summary

First time BRIDGE LIVE IP configuration involves the following steps.

- Unpack the shipping box, retaining the printed BRIDGE LIVE IP Quick Start Guide.
- Mount the BRIDGE LIVE IP chassis into a standard 19-inch wide equipment rack, allowing space for cooling airflow. The chassis occupies only one vertical rack unit.
- Connect the two BRIDGE LIVE IP power cords to AC mains.
- Perform initial network configuration. This is accomplished via the Kiosk interface, using a customer supplied Display Port monitor, keyboard, and mouse.
- Access the BRIDGE LIVE IP UI over your network, using the unique User and Password information for your unit, included in the printed BRIDGE LIVE IP Quick Start Guide provided.
- Connect your IP sources and/or destinations to your BRIDGE LIVE IP. Which IP connectors you use depends on your intended workflow.
- Create an initial BRIDGE LIVE IP workflow by creating the necessary BRIDGE LIVE IP Pipelines, to either encode IP signals to the network, decode from the network to IP, or for encode/decode bidirectional operation.

Initial Hardware Installation

Unpacking

As you unpack the shipping box, carefully examine the contents. Retain the Quick Start Guide, which has important information for that individual BRIDGE LIVE IP unit. Make sure you received everything and that nothing was damaged during shipment. If you find any damage, immediately notify the shipping service and supply them with a description of the damage.

If you find shipping damage, contact your AJA dealer or distributor for details on how to have your BRIDGE LIVE IP repaired or replaced.

NOTE: Save packing materials and the shipping box. If your BRIDGE LIVE IP ever requires service or you move your system, use the packaging materials and box for safe shipment.

Mounting the Chassis

Mount the BRIDGE LIVE IP chassis as desired into a standard 19-inch wide equipment rack, using the provided sliding rails. The chassis occupies only one vertical rack unit.

NOTE: Cooling airflow enters the chassis from the front, and exits from the rear and top panels. Do not obstruct these air vents.

Two rack rail assemblies are included in the rack mounting kit. Each assembly consists of two sections: an inner fixed chassis rail that secures directly to the server chassis and an outer fixed rack rail that secures directly to the rack itself.

The rail assemblies are shipped with rack adapters installed for use with IT (square hole) style rack frames. For IT racks, simply slide the unit into place, as the rails will lock automatically. For use with a standard round hole rack frame, you will need to remove the adapters using a small Phillips head screwdriver.

Connect AC Power

Connect the two BRIDGE LIVE IP power cords to AC mains. For redundancy, use both power supplies and connect them to separate branch circuits. Then the BRIDGE LIVE IP will continue to operate even if a circuit breaker opens on one branch. For even greater reliability, connect one BRIDGE LIVE IP power supply to a UPS, and leave the other connected directly to a live circuit (not through that same UPS). This covers the situation where the UPS itself fails. For the highest level of protection use two UPS units connected to two different branch circuits.

You will power up the unit later, depending on which initial network configuration procedure you decide to use.

Initial System Access via Local Kiosk Interface

1. Connect a computer monitor (user supplied) to any Display Port.
2. Connect a keyboard and mouse (user supplied) to available rear USB connectors.
3. Power up the chassis. The system will boot up to the BRIDGE LIVE IP and display a login splash screen. The same screen will appear when connecting using a remote network connected computer's web interface.

Figure 3. BRIDGE LIVE IP Kiosk View Login Splash Screen

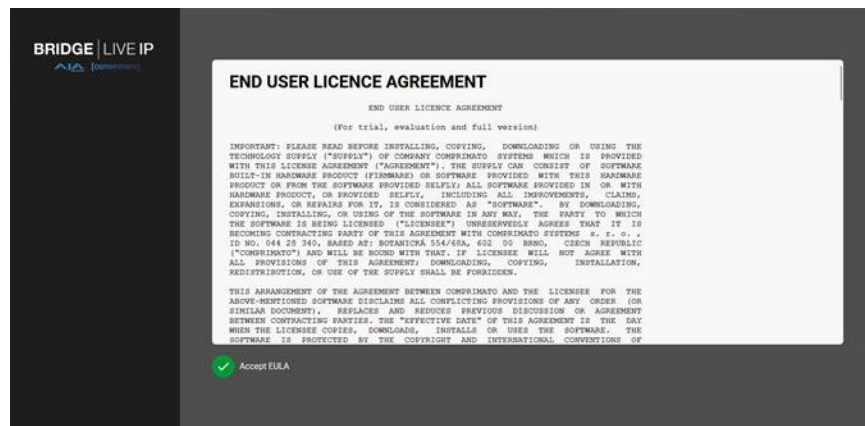


4. At the login screen, enter the system's specific Admin credentials as shown below:
 - Username: admin
 - Password: See the BRIDGE LIVE IP Quick Start Guide for the unit's unique default password.

EULA

When you login to the BRIDGE LIVE IP UI for the first time, you will be prompted to read and accept the EULA. If you change the BRIDGE LIVE IP version using the Version manager, you will be required to accept it again.

Figure 4. BRIDGE LIVE IP EULA



Initial System Setup Process

BRIDGE LIVE IP has a menu driven initial setup process available for first time installation. This allows you to easily set basic system operation parameters.

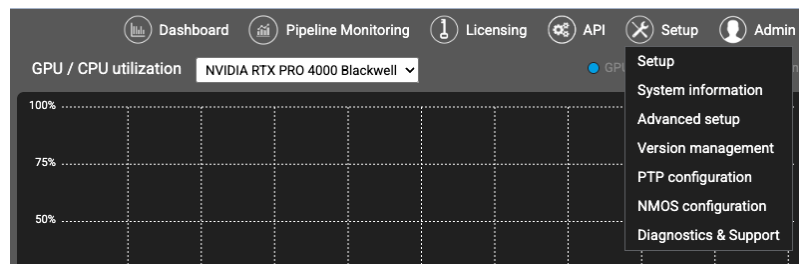
For an initial system setup, you can simply click on the Setup (wrench) icon on top line of the screen. This action takes you directly to the first step of the setup process.

NOTE: The Licensing and API top line icons can also be clicked on to activate them. However, there is no need to access these functions during an initial system setup.

Alternatively you can hover your cursor over the top line Setup Icon, and then click on the Setup item in the opened Setup Menu dropdown. This is the method used to access all the items in this dropdown menu.

NOTE: This cursor hover technique is also used with the Admin top line Icon. However, there is no need to access the Admin functions during initial system setup.

Figure 5. Accessing the Setup menu



NOTE: GPU model displayed in GPU/CPU Utilization selector and UI screens may vary depending on your system configuration.

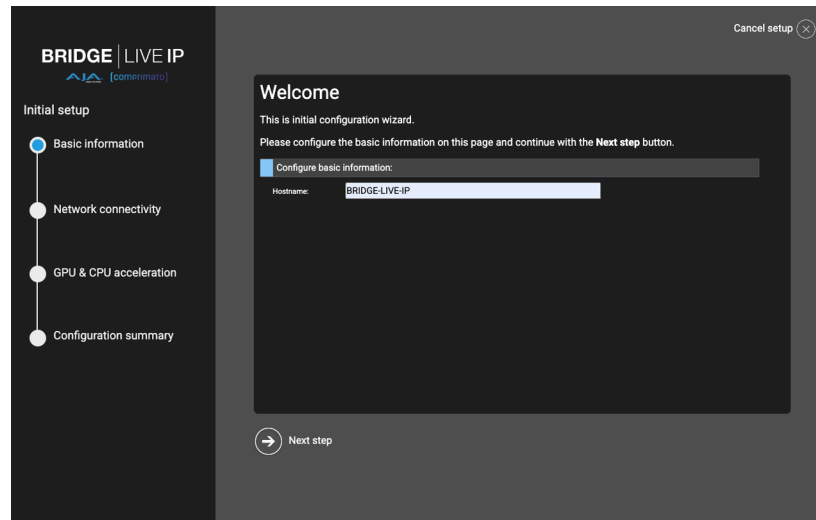
Setup

After selecting Setup, a series of screens will be displayed from which you can select or enter the necessary information. Four screens will be opened in sequence:

- Basic Information
- Network Connectivity
- GPU & CPU Acceleration
- Configuration Summary

Basic Information

Figure 6. Setting the System Hostname



A Welcome screen is displayed first, allowing you to identify that specific BRIDGE LIVE IP system with a unique Hostname.

NOTE: Node name, device will be the pipeline name. Device and Node are distinctive NMOS objects.

NOTE: Host name is also the Node name in NMOS IS-04.

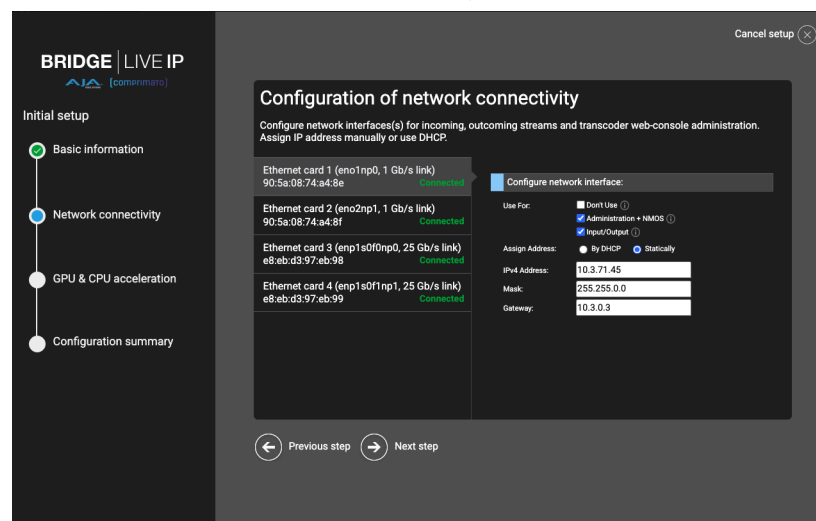
Hostname

Enter a name in the Hostname field, then click **Next step**.

NOTE: BRIDGE LIVE IP host names do not include spaces. Use underscore or hyphen as in the example.

Network Connectivity

Figure 7. Configuring network connectivity



The Network Connectivity screen appears. Here you configure the 10GigE RJ-45s (Ethernet Card 1, 2) and 10/25 GigE SFPs (Ethernet Cards 3, 4).

Under **Configure Network Interface**, set the following:

Configure Network Interface

Select from the following checkboxes:

- Don't Use
- Administration + NMOS
- Input/Output

NOTE: Typically Administration is applied to only one port. If applied to more than one port, you will see a warning message (but not an error).

NOTE: With a dual RJ-45 NIC setup, you cannot have both NICs connected to the same network.

NOTE: If none of the 10/25GigE interfaces are setup, the UI will show a warning.

Assign Address

Select from the following checkboxes:

- By DHCP
- Statically

IPv4 Address

Field will only display if Statically is selected above. Specify static IP.

Mask

Field will only display if Statically is selected above. Specify subnet mask.

Gateway

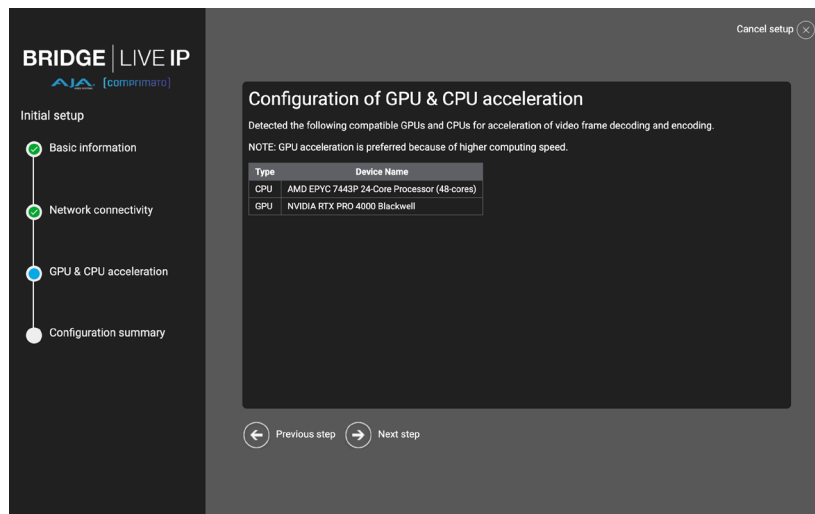
Field will only display if Statically is selected above. Specify gateway.

After entering all the information, click **Next step**.

GPU and CPU Acceleration

This screen is informational only. It reports detected GPUs and CPUs for acceleration of video frame decoding and encoding.

Figure 8. Configuration of GPU & CPU acceleration



NOTE: GPU model displayed in setup or UI screens may vary depending on your system configuration.

Click **Next step** to continue.

Configuration Summary

A summary of the final configuration settings of your device, including hostname, network connectivity, CPU and GPU acceleration, and DNS settings.

Figure 9. Configuration Summary

BRIDGE | LIVE IP
[commercial]

Initial setup

- Basic information
- Network connectivity
- GPU & CPU acceleration
- Configuration summary

Basic information:

Hostname: BRIDGE-LIVE-IP

Network connectivity:

Use	Network interface	IPv4 address	Mask	Gateway	DNS	Default route
A+I/O	Ethernet card 1 (eno1npo, 1 Gb/s link) <i>Connected</i>	10.3.111.107	255.255.0.0	10.3.0.3	manual	☒
N/A	Ethernet card 2 (eno2npt1) <i>Disconnected</i>	-	-	-	-	-
I/O	Ethernet card 3 (enp1s0f0np0, 25 Gb/s link) <i>Connected</i>	172.16.111.107	255.255.0.0	-	manual	☐
I/O	Ethernet card 4 (enp1s0f1np1, 25 Gb/s link) <i>Connected</i>	172.17.111.107	255.255.0.0	-	manual	☐

CPU & GPU acceleration:

Type	Device Name
CPU	AMD EPYC 7443P 24 Core Processor (48-cores)
GPU	NVIDIA RTX PRO 4000 Blackwell

Set DNS manually for whole system:

← Previous step ☒ Save and proceed to stream setup

Basic Information

Provides system hostname details.

Network Connectivity

Provides a summary of the configured network settings before saving and applying to BRIDGE LIVE IP. The default route determines which interface is used by BRIDGE LIVE IP for outbound communication and is also used for internal communication. It is typically the address of another router, which treats the packet the same way: if a route matches, the packet is forwarded accordingly, otherwise the packet is forwarded to the default route of that router.

Click on the Default route circle of the desired NIC.

CPU & GPU Acceleration

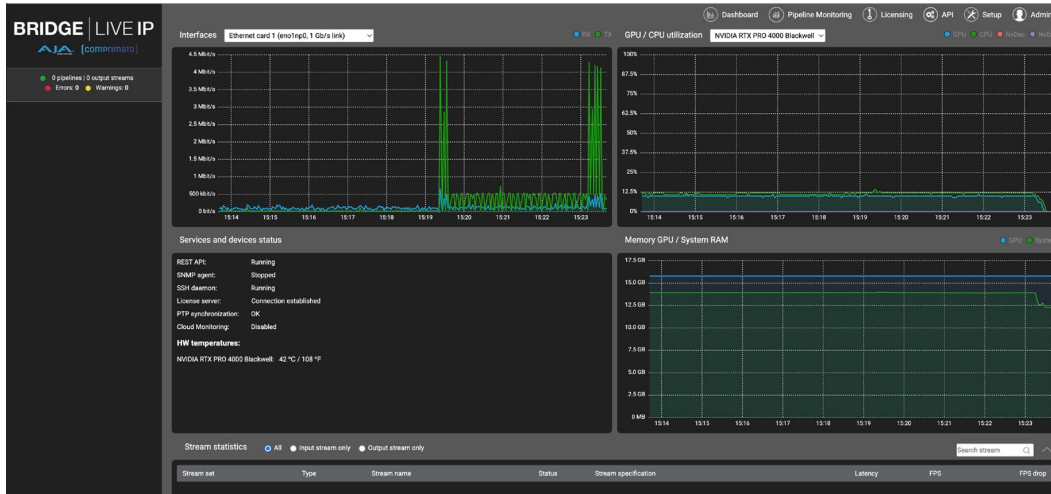
Provides cpu and gpu details.

Set DNS Manually for Whole System

You can manually set which DNS server should be used for your BRIDGE LIVE IP system. The BRIDGE LIVE IP server will send DNS requests to either the primary or secondary DNS server. DNS is a protocol which allows you to translate domain names (www.domainname.com) into IP addresses

Enter any desired Primary and Secondary DNS IP addresses, and then click on the **Save and proceed to stream setup** button to complete your initial system setup. After a short time you are returned to the BRIDGE LIVE IP Dashboard UI.

Figure 10. BRIDGE LIVE IP Dashboard After System Setup



Once your BRIDGE LIVE IP has completed its initial setup, you can build pipelines to meet your workflow needs. See ["Pipeline Configuration" on page 52](#).

BRIDGE LIVE IP System Administration

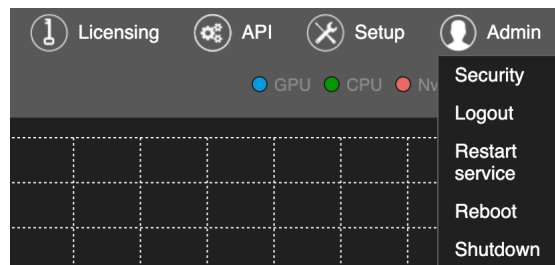
Once a BRIDGE LIVE IP system has been setup with properly configured pipelines, the unit can be easily reconfigured by an end user to select different signal Inputs and Outputs and adjust other pipeline features, using the Dashboard UI.

There are more advanced settings available if needed, which should be implemented by your system administrator.

Admin Menu

Some basic functions can be performed via the Admin Menu. Hover your cursor over the Admin icon and click on the desired function.

Figure 11. Open Admin Menu



Security

Used to manage password security. See ["Password Administration" on page 24](#).

Logout

Logs you out of that BRIDGE LIVE IP's web interface. This will not affect any currently running pipelines. You will need the user name and password for that BRIDGE LIVE IP unit to log back in.

Restart Service

This function assists with restarting the BRIDGE LIVE IP software. This restarts BRIDGE LIVE IP software and related services but does not reboot the machine. This may be useful for specific configuration/debugging purposes as requested by AJA Support.

A "Do you really want to restart...?" prompt appears. After answering **Yes**, all currently running pipelines will be halted and will then restart. You will also be logged out. You will need the user name and password for that BRIDGE LIVE IP unit to log back in.

Reboot

This function performs a complete reboot of the hardware, useful if serious unexplainable problems with signals or OS occur.

A "Do you really want to reboot...?" prompt appears. After answering **Yes**, all currently running pipelines will be halted, the BRIDGE LIVE IP chassis will power cycle, the BRIDGE LIVE IP application will reload, and all the previously active pipelines will be restarted. You will also be logged out. You will need the user name and password for that BRIDGE LIVE IP unit to log back in after the unit has completed its reboot.

Shutdown

A "Do you really want to shutdown...?" prompt appears. After answering **Yes**, all currently running pipelines will be halted and the BRIDGE LIVE IP chassis will power down. To regain operation, the front panel Power button will need to be pressed, and you will need the user name and password for that BRIDGE LIVE IP unit to log back in after the unit has completed its bootup.

Factory Reset

NOTE: *BRIDGE LIVE IP factory reset can only be performed locally using the Kiosk UI, not with a web interface.*

Performing a factory reset will restore BRIDGE LIVE IP to its factory settings. All pipelines and settings, including network setup and passwords, will revert to default factory settings. Only your current licenses will be preserved. Once changes are applied, the server will restart itself and boot into the factory state. The process takes approximately one minute.

WARNING: *Before performing a factory reset, be sure to backup your pipeline configurations. See "Verifying Pipeline Configurations" on page 84 for more information.*

CAUTION: *A factory reset will revert the login credentials back to how they were set at the time of shipment from the factory. You will need to reference your Quick Start Guide for these original login credentials; otherwise you will need to contact AJA Tech Support.*

Keyboard Method

To perform a factory reset using the keyboard:

1. While booting or rebooting the BRIDGE LIVE IP device, repeatedly press the down arrow key on the local keyboard that is connected to the unit. The following options are available:

Figure 12. Factory Reset Options

```
v1.19.0-release:8c4f9a72 (2026-04-19-08:00:00) AJA
> REINSTALL LATEST (v1.19.0-release:8c4f9a72)
```

- Continue booting with the current version (ex. v1.19.0) with **NO** factory reset
- Boot using a previous software version (ex. v1.19.0) with **NO** factory reset
- Reinstall latest version (ex. v1.19.0) **AND** perform a factory reset

NOTE: Examples may not match your available firmware.

2. Select "REINSTALL LATEST"
3. You will need the original Admin credentials indicated in the Quick Start Guide in order to login following the factory reset.

Password Administration

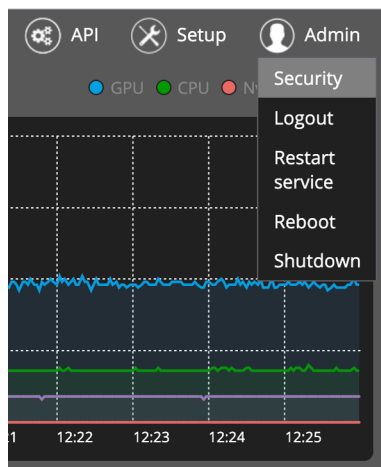
User Types

Two user types exist for a BRIDGE LIVE IP System:

- Admin Username ("admin") is used for local login, browser login and REST API access. This is the user type we are going to be using in the examples below.
- Transcoder Username ("transcoder") is used for CLI (Command Line Interface)/SSH (Secure Shell).

Changing passwords for the two user types is done through the Password management page, accessed through the Admin > Security menu.

Figure 13. Accessing Password Management



Setting Remote Shell Access

From the Password management page, you can enable or disable SSH access to BRIDGE LIVE IP altogether by clicking the Enable button (if currently disabled) or the Disable button (if currently enabled) underneath the Secure Shell (SSH) heading. Remote secure shell (SSH) access is intended only for the transcoder user (console user).

Password Management

Manage passwords for the admin user (web application user) and the transcoder user (console user) by entering the current password, then setting the new password.

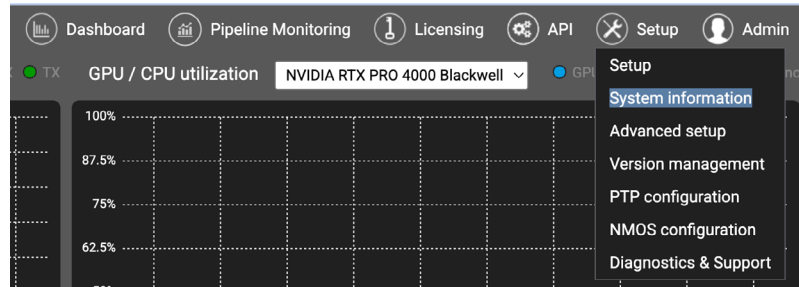
Licensing

Licenses that are ordered at the time of purchasing the BRIDGE LIVE IP unit are pre-installed prior to shipment. At a later date, if you want to order an additional license, you will need to get the unique Installation ID number, found on the System Information page, and contact your AJA Distributor or Regional Sales representative. If you do not know who that is, you can contact AJA Sales directly.

To access the System Information page, select **System Information** from the Setup menu in the upper right area of Dashboard. The System Information page displays.

NOTE: ST 2110 interface activation is functional by default and does not require additional licenses.

Figure 14. Accessing the System Information page from the Setup menu



From the System Information page, the Installation ID is found a few lines below

Installing a New License Package

Typically, new BRIDGE LIVE IP License Packages are delivered as a zip file. If zipped, please unzip the delivered package.

Remote Installation

Accessing BRIDGE LIVE IP through a browser requires that you are using a machine that has network connectivity to the BRIDGE LIVE IP device.

Steps for Installing a New License

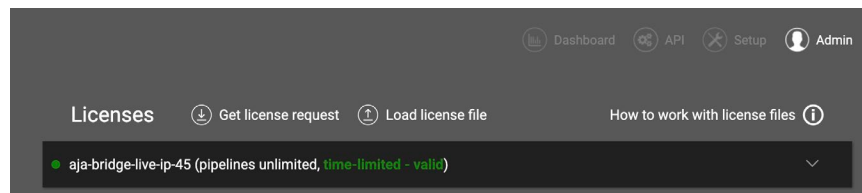
1. From the BRIDGE LIVE IP interface, select the Licensing menu in the upper right area.

Figure 15. The Licensing menu



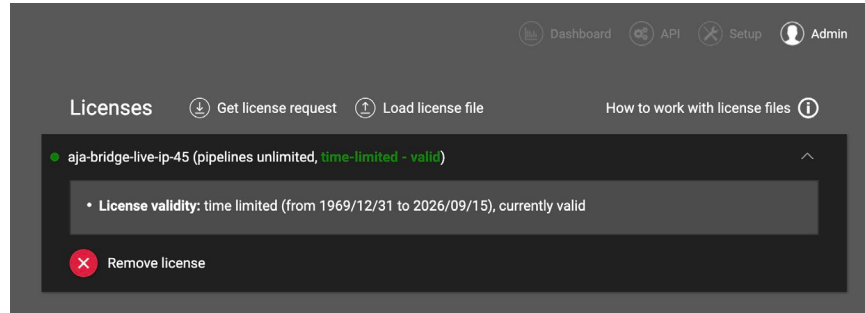
The Licenses page displays.

Figure 16. The Licenses page



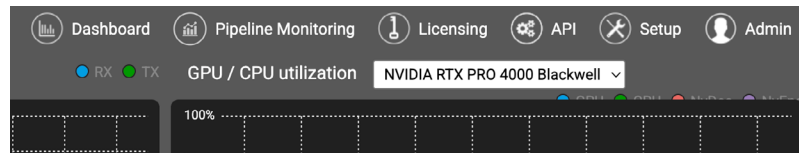
2. Click the downward pointing disclosure triangle to display your License Package details for your previously installed License Package.

Figure 17. The Licenses page displaying previously installed License Package



3. Click the red “X” icon to the right of the currently installed License Package to remove it.
4. Next, with no License Package present, click **Load license file**. A navigation window opens.
5. Navigate to your new License Package location, choose the file, and select **Open**. The new License Package will install.
6. Next, navigate to the License page by clicking **Licensing** in the upper right area of Dashboard.

Figure 18. Accessing the Licenses page



7. From the Licenses page, select **Load license file**. Navigate to the license file, select it, then click **Upload**.

Upon completion of the license upload, the license will immediately be available for use.

License Status

If a license is granted, the status shows “Unlimited time” or the time for which the stream is allowed to produce an output, according to loaded license files. The status will be, for example:

- License: Unlimited time – a stream may produce an output for an unlimited period of time
- License: Till 2021-02-21 23:59:59 – a stream will produce an output until the displayed time point is passed.

NOTE: For your convenience, the status shows the time and date according to your computer's time setting, not the BRIDGE LIVE IP system time, which may be different. For example, during installation, the automatic installer sets the time-zone to America/Los Angeles, but you may be located in a different time zone. Also, you might have offices in different time-zones and would prefer the servers to have the same system time, potentially for monitoring purposes.

If a stream is not allowed to produce an output, the license status reads “Blocked” or “Unavailable” and is shown red. BRIDGE LIVE IP will process the stream as usual, the only difference is that the output will not be sent to defined output destinations. This feature will help you verify your environment abilities, such as system load limits, input stream compliance, and other factors, even if you don't have enough licenses yet. For that reason, the input and output stream status indicator may be green even if the license status is not valid.

Possible invalid license statuses are:

- License: Blocked – there are licenses for the stream loaded in the system, but the count of streams exceed the licensed number (other streams have exhausted the available licenses)
- License: Unavailable – the stream needs a license which is not loaded (the stream contains a feature of newer version of BRIDGE LIVE IP which isn't included in any loaded license)

BRIDGE LIVE IP Software Update

To check for updates for BRIDGE LIVE IP software:

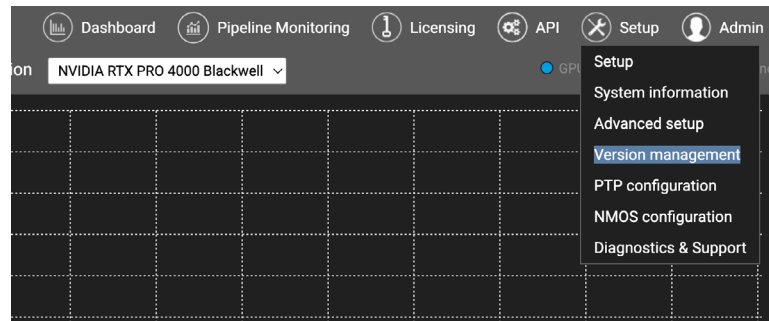
1. Go to the AJA website and view/download the package for BRIDGE LIVE IP:
<https://www.aja.com/products/bridge-live-ip#support>

After unzipping the file, the download will be a .tgz file.

NOTE: MacOS with Safari has a setting that can cause the browser to incorrectly unzip the .tgz file into it's elementary components, making it unusable. To prevent this turn off "Open safe files after downloading" via Safari>Preferences>General.

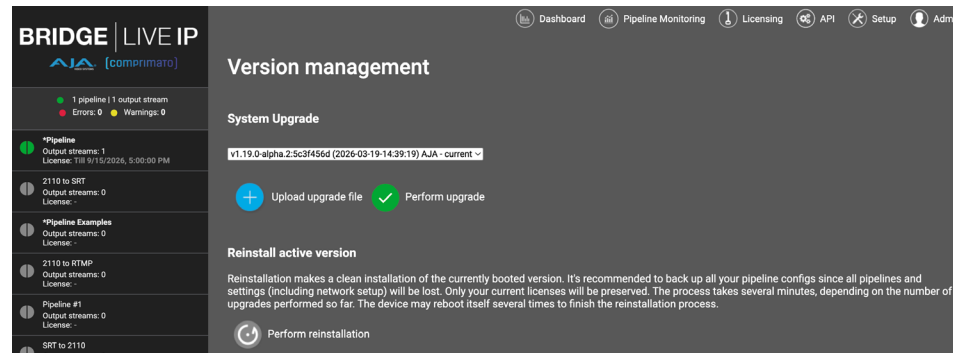
2. Stage the downloaded update on an accessible network location.
3. From within BRIDGE LIVE IP, navigate to **Setup > Version management**.

Figure 19. Accessing the Version management page from the Setup menu



The Version Management Upgrading page displays.

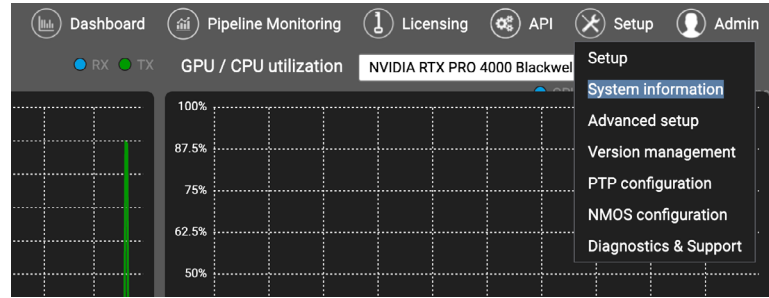
Figure 20. Version management Upgrading page



4. Select **Upload upgrade file** and browse to the downloaded update.
5. Select **Perform upgrade** and confirm processes in subsequent dialogs. BRIDGE LIVE IP will upload and install the update. You will need to reboot the system via the dialog after the update completes.

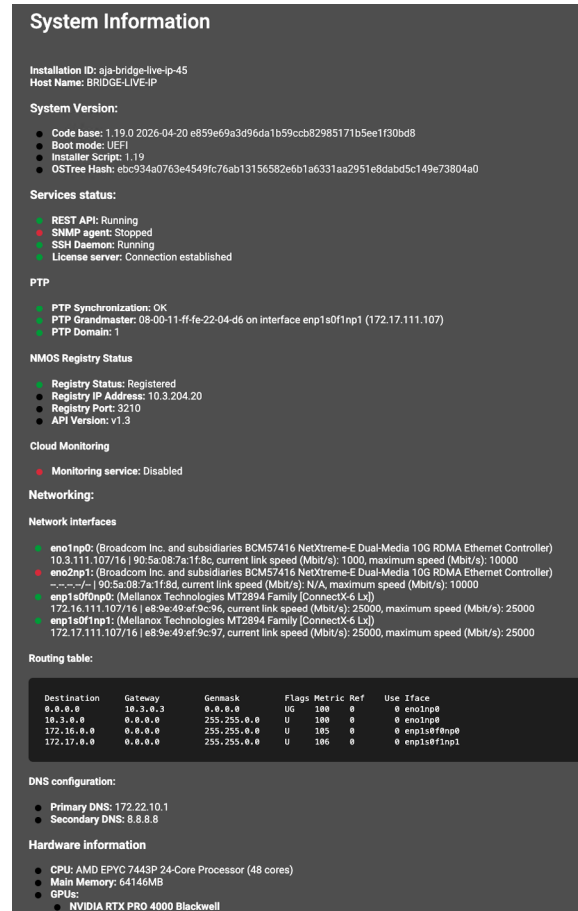
Following the upgrade, you can verify the version installed if you like by navigating to **Setup > System information**.

Figure 21. Accessing the System information page from the Setup menu



The System Information page displays, indicating the version number currently installed and running.

Figure 22. System Information page indicating the version number



In the event that there is an issue or failure during the update process, BRIDGE LIVE IP will automatically retry the upgrade process and reboot up to three times.

If the upgrade is unsuccessful, even after the automatic retries, the UI shows a warning statement at the top of the page with a link to the Version Management page. From the Version Management page, you can retry the upgrade process manually.

Low Latency Operation

Introduction

There are two methods to adjust latency in BRIDGE LIVE IP:

- To set all outputs to lowest latency, applying the low_latency preset will always set every pipeline for the lowest latency possible.
- To set individual outputs to lowest latency, in Output Stream Options, set **Latency Addition** to a value of **-1**. Setting the Output mode to **VBR** further improves latency.

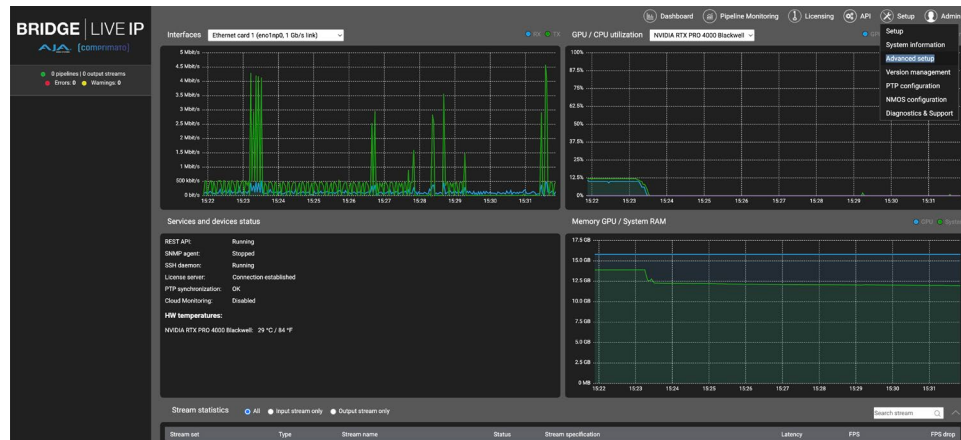
Please follow the appropriate procedure below for your workflow.

Low Latency Using Low Latency Preset

To use low latency presets:

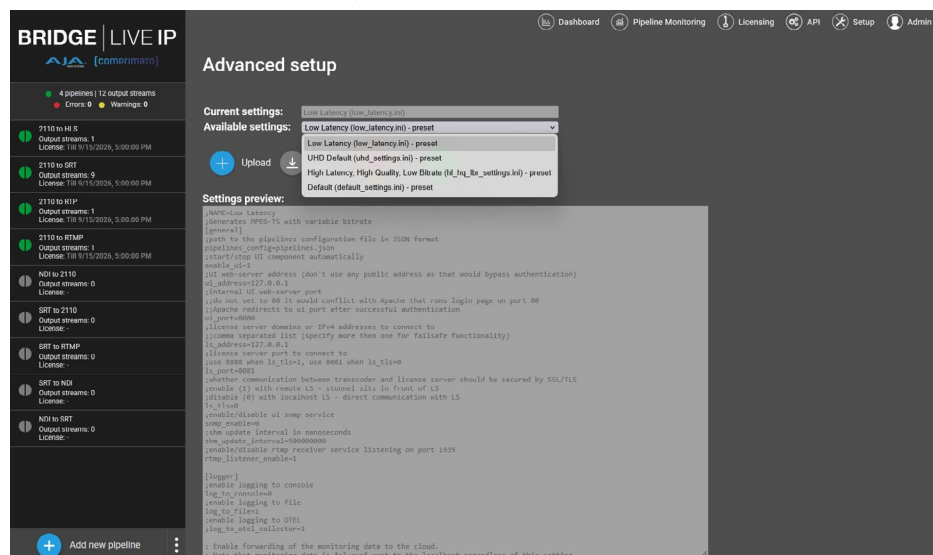
1. In the BRIDGE LIVE IP Dashboard screen, hover your cursor over the Setup item at the top right and click on "Advanced setup".

Figure 23. BRIDGE LIVE IP Dashboard, Advanced Setup



Inside the Advanced setup window that opens, open the drop-down menu of "Available Settings" and choose "Low Latency."

Figure 24. Selecting Low Latency from Available Settings



2. You will be prompted with a verifying message asking if you want the chosen advanced settings .ini file to be used. Click "Next."
3. In the additional pop-up that appears, click "Restart now!"
4. BRIDGE LIVE IP will restart and activate the Low Latency Preset.

NDI Discovery Servers

NDI Discovery servers can act as central resources which detect the presence of all the NDI streams on the network. The NDI discovery service is designed to allow you to replace the automatic discovery NDI uses with one or two servers which operate as a centralized registry of NDI sources.

This can be very helpful for installations where you wish to avoid having significant mDNS (Multicast DNS) traffic for a large number of sources. It can also be useful in situation where multicast is not possible or desirable; it is very common for cloud computing services not to allow multicast traffic.

When using the discovery service, NDI can operate entirely in unicast mode and thus in almost any installation. The discovery servers support all NDI functionality including NDI groups.

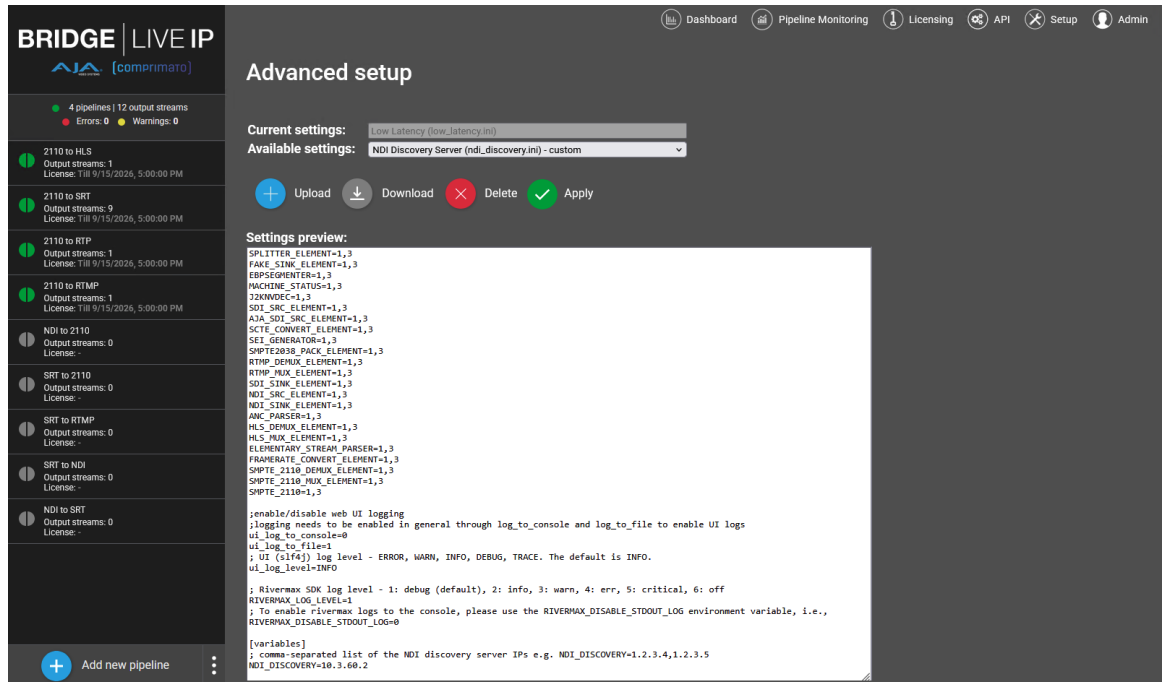
Using NDI Discovery with BRIDGE LIVE IP

In order to utilize NDI Discovery servers, it is necessary to change parameters in the active .ini settings file. See ["Advanced Setup" on page 43](#).

Configure as follows:

- Download the active .ini settings file
- Open the downloaded .ini settings file and locate the line which contains "NDI_DISCOVERY=" and add the IP address of your discovery server to that line (ex. NDI_DISCOVERY=10.3.60.2)
 - If your file doesn't contain a "NDI_DISCOVERY=" line, simply add it to the .ini file (along with the required IP address). While that new line can be located anywhere, appending it to the end of the file makes it easy to find should it require a change. See [Figure 25 on page 31](#).
- To add a second NDI Discovery server, add a comma followed by the NDI Discovery server IP address (ex. NDI_DISCOVERY=10.3.60.2, 10.3.60.3)
- Save your changes, then Upload the updated .ini settings file. Select the file, click Apply, then follow directions to activate

Figure 25. Advanced Setup, NDI Discovery



Timecode Insertion in SEI

BRIDGE LIVE IP supports inserting Timecode into SEI (Supplemental Enhancement Information) for encoding into HEVC or H.264 streams. On BRIDGE LIVE IP, NTP is not used. Timecode insertion will reference PTP.

To configure Timecode Insertion in SEI, it is necessary to change parameters in the active .ini settings file. See ["Advanced Setup" on page 43](#).

HEVC Activation

Download the active .ini settings file and remove the semi-colon on two lines:

- ; NVENC_HEVC_ADD_TIMESTAMPS = 1
- NVENC_HEVC_ADD_TIMESTAMPS = 1
- ; NVENC_HEVC_TIMESTAMPS_IDENTIFIER = cf848278-ee23-306c-9265-e8fef22fb8b8
- NVENC_HEVC_TIMESTAMPS_IDENTIFIER = cf848278-ee23-306c-9265-e8fef22fb8b8

Figure 26. HEVC Activation

```
; timestamp SEI messages (MISB ST 0604)
; -----

; enable/disable adding timecode SEI messages for H.264 nvenc (default: disabled)
; NVENC_H264_ADD_TIMESTAMPS = 1
; enable/disable adding timecode SEI messages for H.264 cpu encoder (default: disabled)
; X264_ADD_TIMESTAMPS = 1

; enable/disable adding timecode SEI messages for H.265 nvenc (default: disabled)
; NVENC_HEVC_ADD_TIMESTAMPS = 1
; timestamp identifier to be used as the uuid_iso_iec_11578 of the user data SEI message
; omit to use the standard one specified in MISB ST 0604 (works for H.265 nvenc only!)
; NVENC_HEVC_TIMESTAMPS_IDENTIFIER = cf848278-ee23-306c-9265-e8fef22fb8b8
```

Save your changes, then Upload the updated settings file. Select the file, click Apply, then follow directions to activate

H264 Activation

Download the active .ini settings file and remove the semi-colon on two lines:

- ; NVENC_H264_ADD_TIMESTAMPS = 1
- NVENC_H264_ADD_TIMESTAMPS = 1
- ; X264_ADD_TIMESTAMPS = 1
- X264_ADD_TIMESTAMPS = 1

Figure 27. X264 Activation

```
; timestamp SEI messages (MISB ST 0604)
; -----

; enable/disable adding timecode SEI messages for H.264 nvenc (default: disabled)
; NVENC_H264_ADD_TIMESTAMPS = 1
; enable/disable adding timecode SEI messages for H.264 cpu encoder (default: disabled)
; X264_ADD_TIMESTAMPS = 1

; enable/disable adding timecode SEI messages for H.265 nvenc (default: disabled)
; NVENC_HEVC_ADD_TIMESTAMPS = 1
; timestamp identifier to be used as the uuid_iso_iec_11578 of the user data SEI message
; omit to use the standard one specified in MISB ST 0604 (works for H.265 nvenc only!)
; NVENC_HEVC_TIMESTAMPS_IDENTIFIER = cf848278-ee23-306c-9265-e8fef22fb8b8
```

Save your changes, then Upload the updated settings file. Select the file, click Apply, then follow directions to activate.

OS and Network Administration

Console Administration

If you want to administer the BRIDGE LIVE IP locally, it is highly recommended that you boot it with the monitor already connected. You can unplug the monitor later, but if you want to use it again, you should re-connect it to any display port.

The default user environment is the aforementioned web-based console. However, for advanced administrative tasks, it is possible to switch to the system console. The background OS is Rocky Linux 9. The standard shortcut Ctrl+Alt+T will take you to the graphical terminal application (not meant for long-term use, only for a quick configuration or diagnostic).

Default Accounts

Admin User

Admin Username: admin

- Used for local login, browser login and REST API

Admin Password:

- See the Quick Start Guide that was originally delivered with your unit for your factory-provided unique password.

Transcoder User

Transcoder Username: transcoder

- Used for CLI/SSH

Transcoder Password:

- See the Quick Start Guide that was originally delivered with your unit for your factory-provided unique password.

NOTE: Due to security reasons, it is not possible to connect using SSH as a root user.

BRIDGE LIVE IP Files Location

Most of the important files are located in /opt/transcoder/ folder including the binaries and configuration files.

System Services

All BRIDGE LIVE IP components run as a system service. You can use the standard OS's interface systemctl to manage those services.

transcoder-base

Starts the BRIDGE LIVE IP and the web server with WebUI at system start.

transcoder-x

Starts graphical window system with lightweight desktop manager OpenBox.

transcoder-browser

Starts Chromium browser in kiosk mode and restarts it in case it detects that Chromium stops running.

transcoder license

Starts the license server with its WebUI at system start.

System Security

The security of the system is provided by a built-in firewall. The setup is available in the UI's setup wizard.

Each network interface needs to be marked with an attribute whether its intent is to be used for:

- Administration – SSH, HTTP(S), SNMP protocols ports allowed
- Incoming/outgoing streams – 1024-65535 /udp 1024-65535tcp 319-320/udp ports allowed
- Both
- Unused

All of the remaining ports are blocked.

In a situation when an interface is marked either Administration or Unused, it will not show in the stream configuration dialogue; therefore, it cannot be selected there.

Chapter 3 – Operation

Overview

BRIDGE LIVE IP is designed as a network appliance, such that once configured it will transport signals across the network without requiring direct user interaction. After initial configuration of the unit for network operation, most of BRIDGE LIVE IP end-user operating procedures involve creating or modifying pipelines, which can be as simple as selecting different available input or output signals.

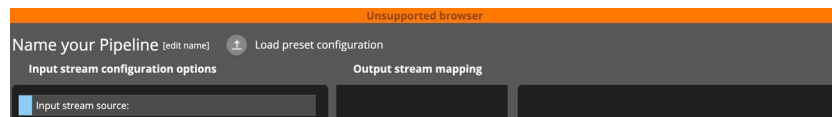
Browser Types

Once BRIDGE LIVE IP has been configured, it can be accessed with a network connected computer running a supported browser (Chrome, Firefox, Edge, Safari).

Unsupported Browsers

Browsers change over time as new functionality is added. In some cases, using an older browser may cause some issues. If that happens, you will be notified that you are using an old or unsupported browser, as pictured in [Figure 28](#).

Figure 28. Example of an Unsupported Browser Message

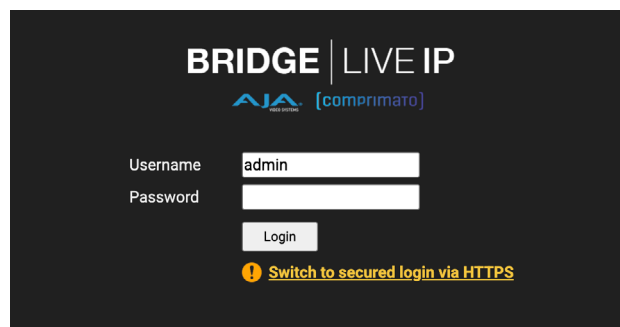


Logging in Remotely with a Browser

Once BRIDGE LIVE IP has been configured, it can be accessed with a network connected computer running a browser.

You login by entering the IP address of that BRIDGE LIVE IP into the browser. The following login prompt appears:

Figure 29. BRIDGE LIVE IP Initial Login Prompt via Browser



The Username is "admin", and the default password that is unique to that BRIDGE LIVE IP unit is included in the Quick Start Guide provided with shipment. If the password has been changed, contact your system administrator for the new password.

After entering the username and password, click **Login**. You will go to the BRIDGE LIVE IP Dashboard displaying showing the general user interface (see "[BRIDGE LIVE IP Dashboard Home View](#)" on page 35).

BRIDGE LIVE IP User Interface Description

Dashboard Interface Basics

Figure 30. BRIDGE LIVE IP Dashboard Home View



The BRIDGE LIVE IP UI has two basic layouts, Home View and Pipeline View. Both views share the same left column, which displays system status and is also used for pipeline operation and selecting a pipeline for configuration.

Home view is the default display when the BRIDGE LIVE IP application is first launched (Figure 30). You can return to Home view at any time by clicking on the BRIDGE LIVE IP logo at the upper left corner of the screen.

Clicking on a pipeline in the left column displays the Pipeline view, showing video configuration information for that pipeline on the right side of the screen (Figure 31).

Home View

Home View provides an overview of system status. It also shows an overview of performance and of the utilization of the system through the following interface elements:

Left Column - Shared with Pipeline View. Pipeline status, pipeline selection for configuration, and controls for starting, stopping, and deleting pipelines.

Upper Left Quadrant - Reports the data throughput transmitted (Tx) and received (Rx) for the selected interface. For IP, it reports what is detected and if it is used for output streaming.

Upper Right Quadrant - GPU utilization/CPU utilization

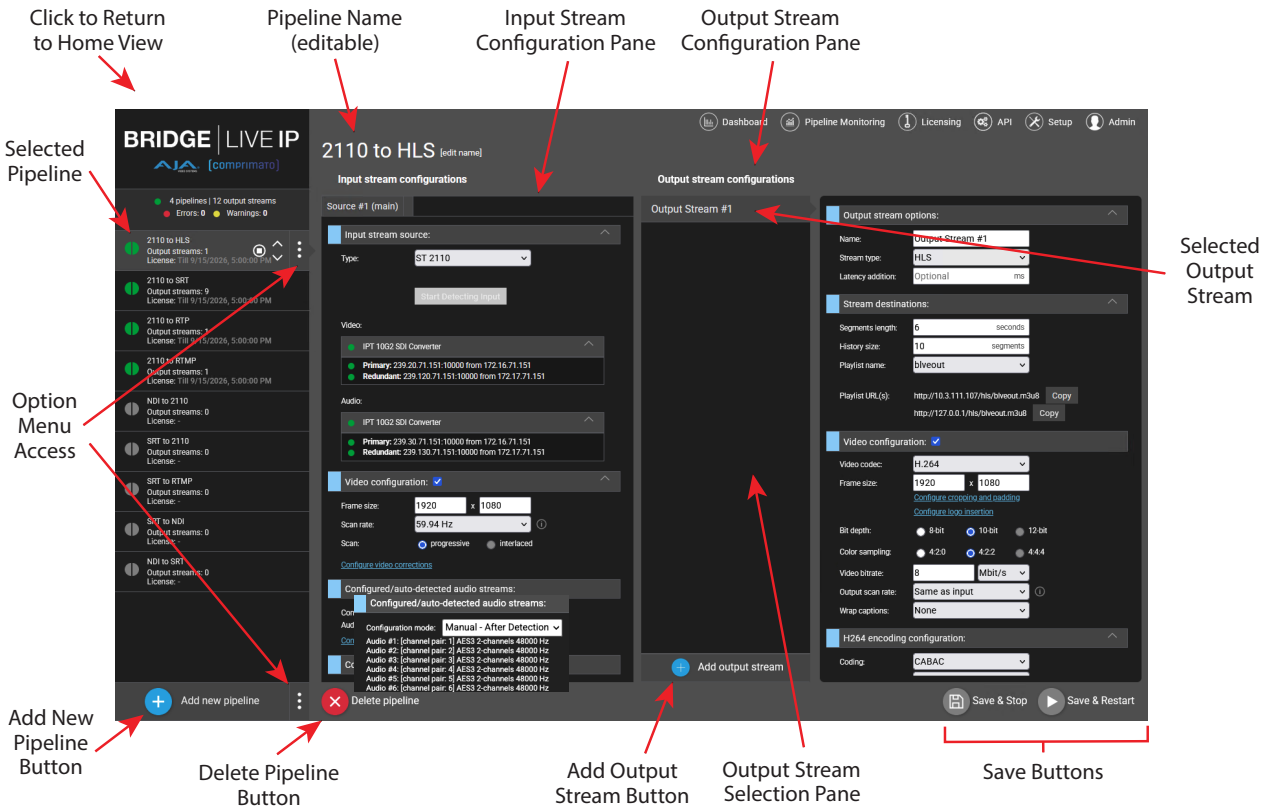
Lower Left Quadrant - Services and devices status

Lower Right Quadrant - Memory GPU/System RAM

Lower Panel - Stream statistics including stream latency, FPS and FPS drops

Pipeline View

Figure 31. BRIDGE LIVE IP Dashboard Pipeline View



Left Column - Shared with Home View. Pipeline status, pipeline selection for configuration, and controls for starting, stopping, and deleting pipelines.

Input Stream Configuration Pane - Input stream configuration parameters, which will vary depending on type of input stream.

Output Stream Selection Pane - Output stream addition and selection, used for pipelines that support multiple output streams.

Output Stream Configuration Pane - Output stream configuration parameters, which will vary depending on type of input stream.

Pipeline Control Buttons - Located at the bottom of the screen, these buttons affect the currently selected pipeline or output stream, allowing you to Delete and Save pipelines. Different button functions are displayed, depending on the current pipeline configuration step.

The Left Column (Pipelines)

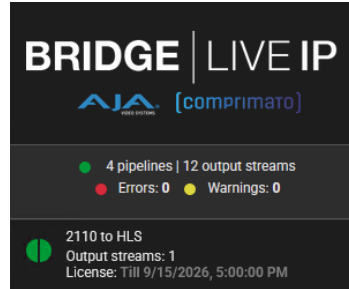
Beneath the AJA and Comprimato logos, in the top left of the interface, is a summary of the number of running pipelines, beneath which are flags for Errors (Red) or Warnings (Yellow).

Flags, Warnings and Errors

The Pipeline status indicators shown in [Figure 32](#) show the number and types of errors, along with indicators for configured and applied Pipelines.

Hover the mouse over a half circle to see specific error messages for a Pipeline.

Figure 32. Pipeline status indicators



Pipelines

Below the errors and warning flags the currently configured pipelines are displayed. Clicking on a pipeline displays information for that selected pipeline.

On the left side, each pipeline has a circular status icon. The left half of the colored circle provides feedback on the incoming part of the pipeline, while the right side indicates the status of the outgoing part of the pipeline.

Immediately to the right of the circular icon is the name of the pipeline. An asterisk (*) in front of the name indicates changes have been made to that pipeline's configuration that have not been saved.

Further to the right, when hovering the mouse over the pipeline, there is also a toggle pipeline stop and start button.

Figure 33. Pipeline Stop Button

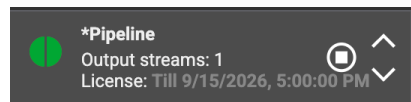
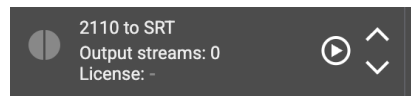
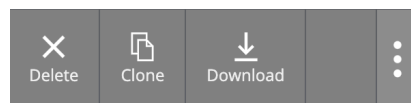


Figure 34. Pipeline Play Button



When hovering the mouse, along the right edge of each pipeline is a vertical ellipsis. Clicking on the ellipsis will toggle the button to display the following three options:

Figure 35. Pipeline Delete, Clone, Download Buttons

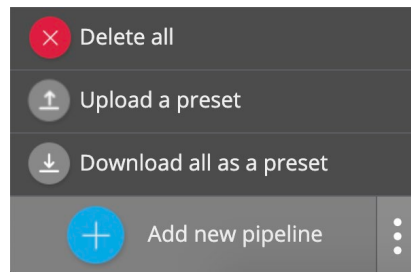


Use these buttons to delete, clone or download a pipeline.

Backing Up Pipelines

Once you have created all the pipelines you need, you can create a backup of them. From the lower left corner, click the vertical ellipsis next to "Add new pipeline" to open the Pipelines Management pop-up menu.

Figure 36. Pipelines Management Menu



Select "Download all as a preset." All of your pipeline configuration settings will download as a "pipelines.json" file.

You can upload this file in the future to upload your pipeline preset using the "Upload a preset" menu. If the name of an uploaded pipeline is identical to an existing pipeline, the name will be appended with #1, #2, etc.

Additionally, you can delete all pipelines by selecting the "Delete all" menu.

Output Streams and Licenses

Beneath the name of the pipeline is an indication of the number of output streams associated with the pipeline. For every stream, there is also information on license status. Streams need to be licensed in order to run. For H.265, H.264 and H.262, BRIDGE LIVE IP will come with perpetual licenses.

Meaning of Color Statuses

	Both sides Grey - No pipeline has been created (new system or all pipelines deleted). The pipeline has been stopped. Right side Grey - The output is not configured
	Red - There is an error causing the pipeline not to work correctly. Left side for input, right side for output.
	Yellow - Standby mode. This can occur, for example, when a pipeline is in SRT mode and the stream does not have a subscriber. In that case, the stream is not being sunk. In this case when a subscriber is actively receiving the stream, the signal turns green. Another example is HLS buffering.
	Green - The stream is working correctly (and in the case of SRT, is being subscribed to).

Add New Pipeline Button

The bottom left corner of the Dashboard has an **Add new pipeline** button for adding a new pipeline. Selecting it directs you to the pipeline window. This is the same window accessed when you want to change the configuration of an existing pipeline.

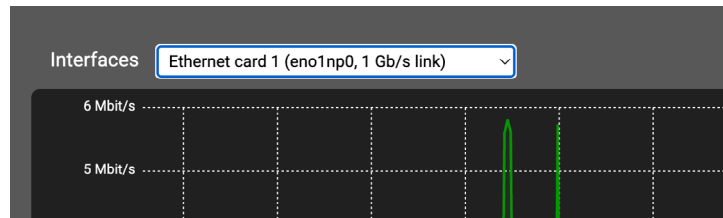
Returning to Dashboard Home View

At any time, to return to the main Dashboard home view, click the AJA/Comprimato logos in the top left area of the Dashboard interface.

Upper Left Quadrant – Interfaces

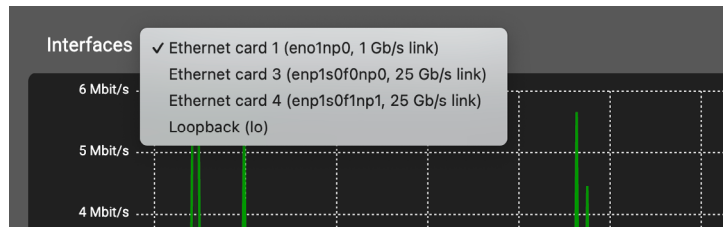
The first quadrant (upper left) displays information for the BRIDGE LIVE IP's I/O signals. When an interface is selected, the configuration status and format of those incoming signals are displayed ([Figure 37](#)).

Figure 37. Interfaces Panel of Dashboard



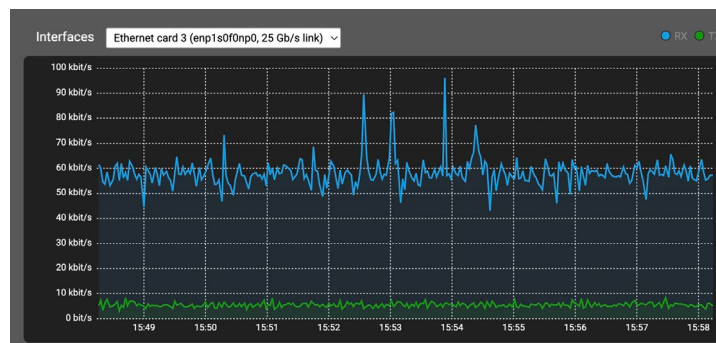
Clicking on the Interfaces box presents a dropdown menu ([Figure 38](#)).

Figure 38. Interfaces Panel Drop-down Menu



Selecting an Ethernet Card displays a chart over time of data transfer ([Figure 39](#)). The Loopback setting is used for system testing purposes.

Figure 39. Interfaces panel Ethernet Selection

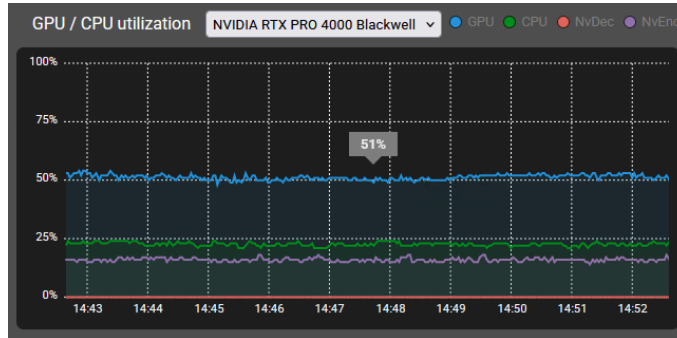


Upper Right Quadrant – GPU/CPU Utilization

The second quadrant (upper right) shows GPU/CPU utilization hardware components. The GPU has three statistics. The blue line shows the level of GPU utilization. NvEnc and NvDec represents the workload of the NVIDIA hardware encoder decoder respectively.

Hover the mouse over a line to see the percentage of utilization of that component at that point in time on the graph.

Figure 40. GPU utilization/CPU utilization panel of Dashboard

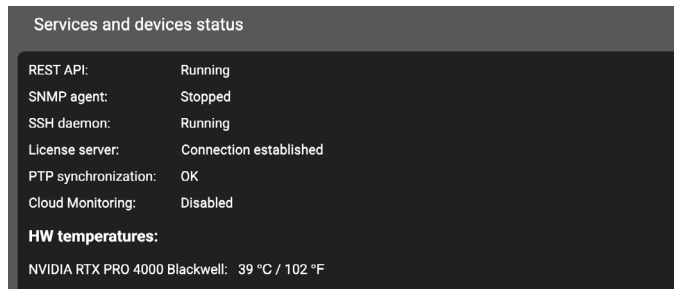


NOTE: JPEG2000 is offloaded to the GPU. For reliability, it is recommended to limit CPU utilization to 75%.

Lower Left Quadrant – Services and Devices Status

The lower left quadrant, Services and devices status, reports statistics for services that are running. It reports what is running, and it also displays the status of the License server. In the example shown below, the License server is initialized. Hardware temperatures are also reported.

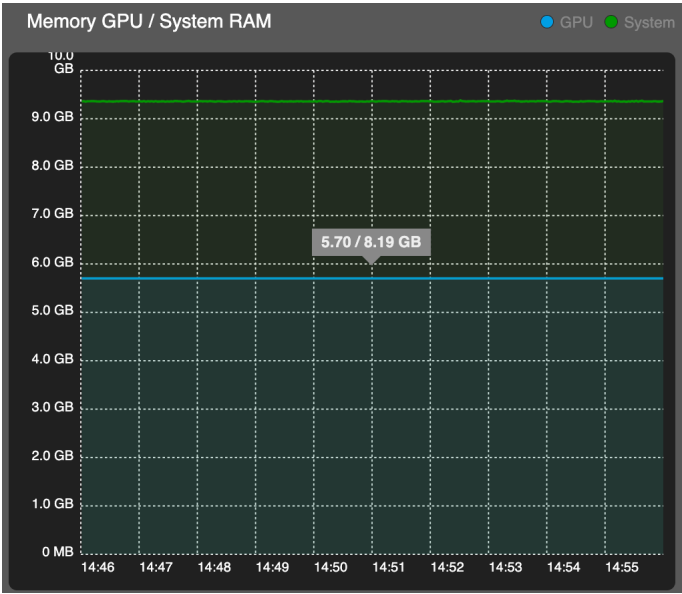
Figure 41. Services and devices status panel of Dashboard



Lower Right Quadrant – Memory GPU/System RAM

The lower right quadrant, Memory GPU/System RAM, reports memory consumption. When you hover the mouse over the line in the graph, a mouse-over message reports the amount of memory used at that point in time, followed by the amount of memory that was available.

Figure 42. Memory GPU/System RAM panel of Dashboard



Lower Panel

In the lower panel of Dashboard, you can see a list of all currently running streams, both input and output. Use the Stream statistics radio buttons to filter by All, Input stream only, or Output stream only. Clicking on a column name on the top gray line sorts the list by that category. You can also search for a particular stream using the search tab in the upper right section of the panel.

If an error occurs, the relevant lines will turn red. When you hover the cursor over a red line, a brief description of that error will be displayed.

Figure 43. Dashboard Stream Statistics

Stream statistics

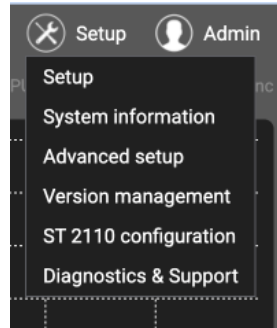
☒ All ☐ Input stream only ☐ Output stream only

Search stream

Stream set	Type					FPS	FPS drop
2110 to HLS	Output/Destination	WARNING: Output Stream #2 is not able to connect. Sink: rtmp://youtube.com:1935/live/stream-key: Connection timed out! Trying to reconnect. ERROR: Output Stream #2 is not producing any data to destination rtmp://youtube.com:1935/live/stream-key.				60.00 fps	0.00 fps
2110 to HLS	Output/Destination	Output Stream #2	Pipeline is successfully started.		4Hz 4:2:2 10-bit	0.00 ms	0.00 fps
			Sink: rtmp://youtube.com:1935/live/stream-key				
2110 to SRT	Input	Source #1	OK	H.264 1920x1080p @59.94Hz 4:2:2 10-bit SRC: hls://http://10.3.111.107/hls/blveout.m3u8		118.19 ms	60.00 fps
				Uncompressed 1920x1106p @59.94Hz 4:2:2 8-bit			

NOTE: Inactive pipelines still being configured will not be displayed on the stream statistics list.

Setup Menu



Additional setup and information screens can be accessed by hovering your cursor over the Setup top menu button, and then clicking on the desired menu item.

Setup

Initiates an initial system setup procedure (see ["Initial System Setup Process" on page 18](#)). If you do not want to run this procedure, click on **Cancel Setup**.

System Information

To view system information, click System information. System information reports various aspects of the system including software version, OS version, Installation ID, Host Name, Memory statistics, drivers, hardware and network information.

Figure 44. System Information Details

System Information

Installation ID: aja-bridge-live-ip-45
Host Name: BRIDGE-LIVE-IP

System Version:

- Code base: 1.19.0.2026-04-20 e859e9a3d96da1b59ccb82985171b5ee1f30bd8
- Boot mode: UEFI
- Installer Script: 1.19
- OSTree Hash: ebc934a0763e4549fc76ab13156582e6b1a6331aa2951e8dbd5c149e73804a0

Services status:

- REST API: Running
- SNMP agent: Stopped
- SSH Daemon: Running
- License server: Connection established

PTP

- PTP Synchronization: OK
- PTP Grandmaster: 08-00-11-ff-fe-22-04-d6 on interface enp1s0f1np1 (172.17.111.107)
- PTP Domain: 1

NMOS Registry Status

- Registry Status: Registered
- Registry IP Address: 10.3.204.20
- Registry Port: 3210
- API Version: v1.3

Cloud Monitoring

- Monitoring service: Disabled

Networking:

Network Interfaces

- eno1np0: (Broadcom Inc. and subsidiaries BCM57416 NetXtreme-E Dual-Media 10G RDMA Ethernet Controller) 10.3.111.107/16 | 90:5a:08:7a:1f:8c, current link speed (Mbit/s): 1000, maximum speed (Mbit/s): 10000
- eno2np1: (Broadcom Inc. and subsidiaries BCM57416 NetXtreme-E Dual-Media 10G RDMA Ethernet Controller) 10.3.16.0 | 90:5a:08:7a:1f:8d, current link speed (Mbit/s): N/A, maximum speed (Mbit/s): 10000
- enp1s0f0np0: (Mellanox Technologies MT2894 Family [ConnectX-6 Lx]) 172.16.111.107/16 | e8:9e:49:af:9c:96, current link speed (Mbit/s): 25000, maximum speed (Mbit/s): 25000
- enp1s0f1np1: (Mellanox Technologies MT2894 Family [ConnectX-6 Lx]) 172.17.111.107/16 | e8:9e:49:af:9c:97, current link speed (Mbit/s): 25000, maximum speed (Mbit/s): 25000

Routing table:

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Interface
0.0.0.0	10.3.0.3	0.0.0.0	UG	100	0	0	eno1np0
10.3.0.0	0.0.0.0	255.255.0.0	U	100	0	0	eno1np0
172.16.0.0	0.0.0.0	255.255.0.0	U	100	0	0	enp1s0f0np0
172.17.0.0	0.0.0.0	255.255.0.0	U	100	0	0	enp1s0f1np1

DNS configuration:

- Primary DNS: 172.22.10.1
- Secondary DNS: 8.8.8.8

Hardware information

- CPU: AMD EPYC 7443P 24-Core Processor (48 cores)
- Main Memory: 64146MB
- GPUs:
 - NVIDIA RTX PRO 4000 Blackwell

Advanced Setup

Access Advanced setup by clicking the Advanced setup option under the Setup mouse-over. You can select among saved configurations under Available settings drop-down menu. Configurations are stored in BRIDGE LIVE IP using .ini files. Users can download, edit, upload, and activate various settings and features via these files.

Click the Apply button in order to set the chosen settings configuration. After that, you will be prompted to restart the BRIDGE LIVE IP service in order to apply changes. This configuration allows you to edit parameters, which adjust the transcoding process, such as GPU memory distribution, encoding presets, and other settings.

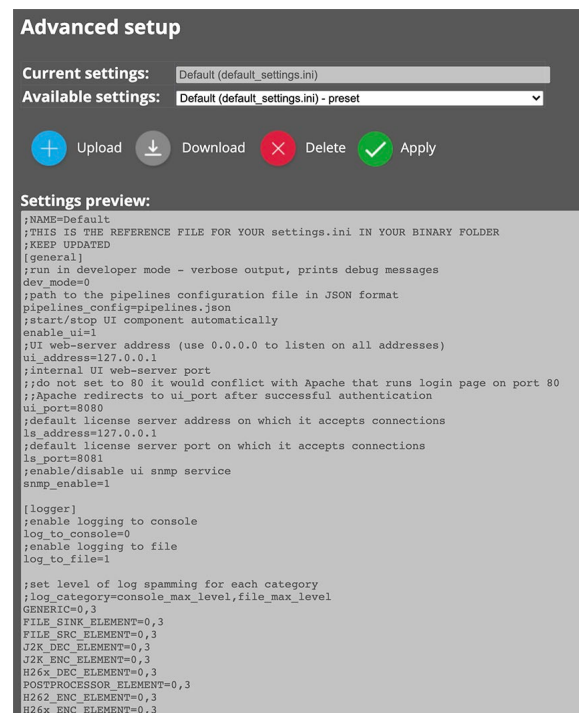
The suffix “preset” means that the file is the pre-configured one, which in general should work best with a particular use case. The suffix “custom” points out the fact that this settings file was uploaded to BRIDGE LIVE IP by the end user. It is advised to consult the configuration adjustments with your support team.

Advanced setup presets

BRIDGE LIVE IP has four advanced settings presets available:

- Low Latency - Faster muxing speed, enables low latency configuration.
- Default - Slower muxing speed, B-frame encoding, adds 2000ms to latency.
- High Latency, High Quality, Low Bitrate - Slowest muxing speed, highest quality.
- UHD Default - Recommended for ALL UHD use cases.

Figure 45. Advanced Settings Management



See [“Low Latency Operation” on page 29](#) for an example using Advanced Setup.

Version Management

See [“BRIDGE LIVE IP Software Update” on page 27](#) for information.

ST 2110 Configuration

Access SMPTE ST 2110 configuration setup by clicking the ST 2110 Configuration option under the Setup mouse-over. The ST 2110 Configuration page is used for PTP Configuration, NMOS Configuration, and RTP Payload Type settings.

PTP Configuration

Click on the PTP Configuration tab to open the PTP Configuration panel.

Figure 46. PTP Configuration

The screenshot shows the 'ST 2110 Configuration' panel with three tabs: 'PTP Configuration' (selected), 'NMOS Configuration', and 'RTP Payload Types'. Under 'PTP Configuration', there is a 'Show Troubleshooting Guide' link. The 'Status' section shows three green checkmarks: 'PTP Synchronization: OK', 'PTP Grandmaster: ec-46-70-ff-fe-0d-0a-28 on interface enp1s0f1np1 (172.17.111.107)', and 'PTP Domain: 1'. The 'Configuration' section states 'PTP profile used is SMPTE-2059-2.' and lists five settings: 'PTP Domain: 1', 'Announce Interval: -2', 'Sync Interval: -3', 'Announce Receipt Timeout: 3', and 'Hybrid E2E: [checkbox]'. Each setting has an information icon. At the bottom is a green 'Submit' button with a checkmark icon.

SMPTE ST 2110 requires system time to be precisely synchronized over the network. The PTP (Precision Time Protocol) time synchronization protocol does this. Time is obtained from master clocks on the network. NTP is disabled to avoid clashes with PTP.

WARNING: Do not enable NTP.

In BRIDGE LIVE IP, PTP works only through the network interfaces with 10/25G SFP28 ports (usually named **enp1s0f0np0** and **enp1s0f1np1**) and not the 10GigE RJ-45 ports.

To allow PTP through the firewall, the network interface needs to first be configured as Input/Output. See "[Network Connectivity](#)" on page 21

Figure 47. PTP Firewall Configuration

The screenshot shows the 'Use For:' section with three radio button options: 'Don't Use' (unselected), 'Administration + NMOS' (unselected), and 'Input/Output' (selected). Each option has an information icon.

NOTE: Currently, it is not possible to choose Grandmaster manually. BRIDGE LIVE IP regularly checks for Grandmaster on both SFP28 NICs, and selects it automatically using the Best Master Clock Algorithm (BMCA).

The PTP Configuration page provides status and configuration options for specifying PTP clock synchronization settings.

Status

Informational display of PTP status.

Figure 48. Correct PTP Configuration

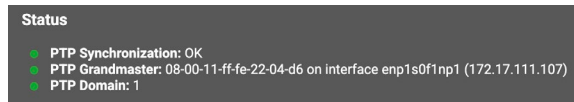


Figure 49. PTP Configuration without Grandmaster

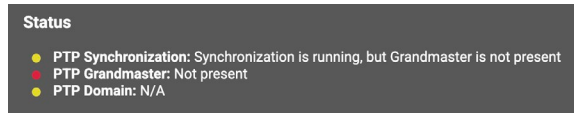
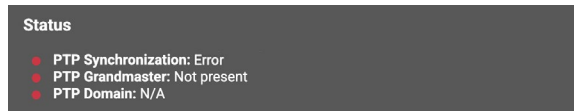


Figure 50. Incorrect PTP Configuration



PTP Synchronization

- OK
 - Synchronization is running and the Grandmaster is present
 - PTP configuration valid and ST 2110 is ready to be used
- *Synchronization is running, but Grandmaster is not present*
 - All PTP synchronization services are running as configured, but can't find any Grandmaster
 - If this occurs shortly after submitting a PTP configuration, try refreshing the page after a few seconds.
 - Double-check the configuration and try the Troubleshooting steps.
- *Error*
 - An internal error occurred. Go to Setup > Diagnostics & Support, select 'Create and download diagnostic report' and send the report to AJA Support
 - Rebooting the device will likely resolve the problem

NOTE: The Grandmaster may be present but AJA does not recommend using BRIDGE LIVE IP in this state.

PTP Grandmaster

- *Not present*
 - Time isn't synchronized, so ST 2110 streams won't work correctly
- *08-00-11-ff-fe-22-04-d6 on interface enp1s0f1np1 (172.17.111.107)*
 - 08-00-11-ff-fe-22-04-d6
 - In this example, the ID of the currently selected Grandmaster
 - enp1s0f1np1 (172.17.111.107)
 - In this example, the network interface name and IP address on BRIDGE LIVE IP that leads to the currently selected Grandmaster

PTP Domain

- *0-127*
 - Currently configured domain number
- *N/A (Not Available)* indicates the domain can't be shown right now

NOTE: The same status information is available under Setup > System Information.

Configuration

Various PTP configuration values can be set on this page:

PTP Domain

A domain consists of one or more PTP devices communicating with each other as defined by the protocol. The domain is identified by an integer, the domain number, in the configurable range of 0 to 127. The default ST 2110 PTP domain is 127.

Announce Interval

The mean time interval between Announce messages. A shorter interval makes PTP react faster to the changes in the master-slave hierarchy. The interval should be the same in the whole domain. It is specified as a power of two in seconds. The default is 0 (1 second).

Sync Interval

The mean time interval between Sync messages. A shorter interval may improve the accuracy of the local clock. It is specified as a power of two in seconds. The default is -3 (125 milliseconds).

Announce Receipt Timeout

The number of missed Announce messages before the last Announce message expires. The default value is 3.

Hybrid E2E

When enabled, ports in the client state send their delay request messages to the unicast address taken from the server's announce message. Ports in the server state will reply to unicast delay requests using unicast delay responses. The default is disabled.

Troubleshooting for Common PTP Issues

Follow these steps to resolve common PTP issues:

- Verify that the configuration is correct
 - Verify that the domain number matches the PTP source device's domain number
 - Check the PTP Network Interface Card (NIC)
 - Ensure the PTP NIC is running with a valid IP address on the Setup > System Information page
 - Ensure the PTP NIC is configured as Input/Output in Setup
 - Ensure the PTP network uses the 25GigE SFP28 ports, not the 10GigE RJ-45 ports
 - If Hybrid E2E is enabled, try disabling it, as the specified grandmaster device may not support it
- Reapply the PTP configuration
 - Re-submit the current PTP configuration (submitting restarts PTP services)
 - Reset to the default PTP configuration (hover with mouse over to get default values)
 - If above methods are unsuccessful, reboot the machine to restart all PTP related services

NMOS Configuration

Click on the NMOS Configuration tab to open the NMOS Configuration panel.

Figure 51. NMOS Configuration

ST 2110 Configuration

PTP Configuration **NMOS Configuration** RTP Payload Types

NMOS Configuration [Show Troubleshooting Guide](#)

Status

- Registry Status: Registered
- Registry IP Address: 10.3.204.23
- Registry Port: 3210
- API Version: v1.3

Configuration

☐ Disabled ☐ Multicast ☐ Unicast ☒ Static

Protocol: ☒ http:// ☐ https:// ⓘ

IP Address: ⓘ

Port: ⓘ

API Version: ⓘ

☒ Submit

The NMOS (Network Media Open Specification) Configuration page provides status and configuration options for discovery, registration, and connection management for ST 2110 NMOS settings.

BRIDGE LIVE IP supports the following NMOS standards:

- IS-04 Discovery and Registration – v1.2 and v1.3
- IS-05 Device Connection Management – v1.0 and v1.1

All NMOS APIs are available via port 80.

Network Interface Configuration

By default, NMOS APIs are available on the eno1np0 network interface (labeled LAN 1 on the BRIDGE LIVE IP backplate). NMOS can be supported by in-band SFPs and out-of-band RJ45 connections.

To use a different network interface:

- Navigate to Setup to open the configuration wizard.
- In the Network Connectivity step, enable the Administration + NMOS checkbox of the desired network interface.

You can enable NMOS on multiple network interfaces simultaneously if needed but the node will only be available on the registry with the highest priority.

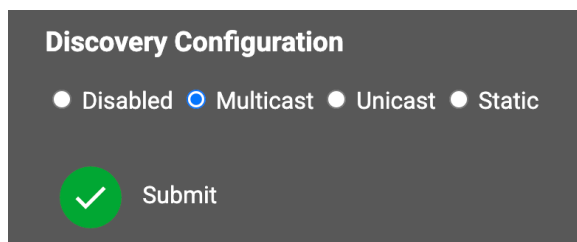
Configuring NMOS Discovery

ST 2110 streams are typically managed through a centralized NMOS Registry. BRIDGE LIVE IP supports multiple methods for discovering and connecting to your NMOS Registry service.

To configure NMOS Registry discovery:

1. Navigate to Setup > ST 2110 Configuration > NMOS Configuration in the UI.
2. Select one of the following discovery modes:
 - **Disabled** – Completely disables NMOS Registry discovery
 - **Multicast** – Discovers the registry via DNS Service Discovery on the local network via multicast.
 - **Unicast** – Discovers the registry via DNS Service Discovery on a network specified by domain name.
 - **Static** – Bypasses discovery and connects directly to the NMOS Registry using a manually specified Protocol, IP Address, Port, and API Version

Figure 52. NMOS Discovery Configuration



The panel is titled "Discovery Configuration". It contains four radio buttons: "Disabled", "Multicast" (which is selected), "Unicast", and "Static". Below these buttons is a green circular icon with a white checkmark and the text "Submit".

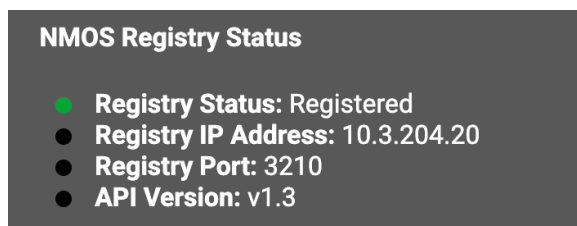
NMOS Registry Status

You can view the current NMOS Registry connection status in two locations:

- Setup > ST 2110 Configuration > NMOS Configuration
- Setup > System Information

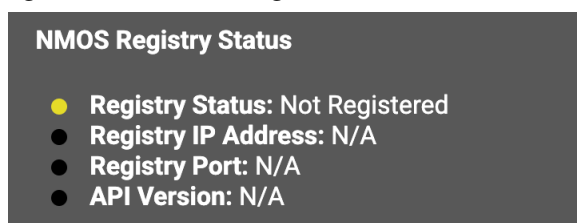
When successfully connected, the status displays the registry's IP Address, Port, and API Version. If not connected, the status shows empty values.

Figure 53. NMOS Registered Status



The panel is titled "NMOS Registry Status". It displays four items, each with a colored dot and text: a green dot for "Registry Status: Registered", a black dot for "Registry IP Address: 10.3.204.20", a black dot for "Registry Port: 3210", and a black dot for "API Version: v1.3".

Figure 54. NMOS Not Registered Status



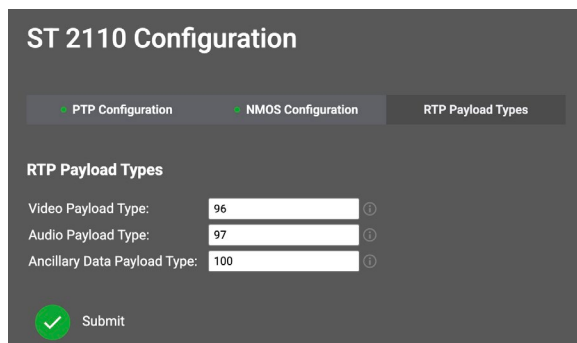
The panel is titled "NMOS Registry Status". It displays four items, each with a colored dot and text: a yellow dot for "Registry Status: Not Registered", a black dot for "Registry IP Address: N/A", a black dot for "Registry Port: N/A", and a black dot for "API Version: N/A".

SDP files for specific receivers or senders can also be retrieved via the REST API. See ["Retrieving SDP files via the REST API" on page 109](#).

RTP Payload Types

Click on the RTP Payload Type tab to open the RTP Payload configuration panel.

Figure 55. RTP Payload Types



The panel is titled "ST 2110 Configuration". It has three tabs: "PTP Configuration", "NMOS Configuration", and "RTP Payload Types" (which is selected). Below the tabs, the "RTP Payload Types" section contains three input fields: "Video Payload Type:" with the value "96", "Audio Payload Type:" with the value "97", and "Ancillary Data Payload Type:" with the value "100". Each input field has a small circular icon with an "i" to its right. At the bottom of the panel is a green circular icon with a white checkmark and the text "Submit".

BRIDGE LIVE IP supports three payload types - Video, Audio, and Ancillary Data. Each of them is represented by a different number in all the SDPs that BRIDGE LIVE IP creates for ST 2110 pipeline outputs.

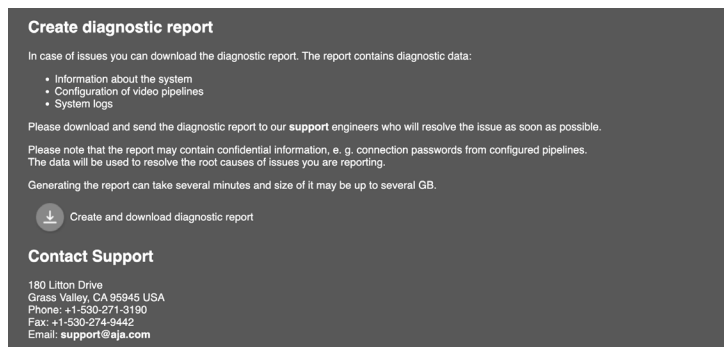
WARNING: *Changing the Payload type should only be performed if required for the ST 2110 network. The default payloads are most commonly used.*

Diagnostics & Support

The Diagnostics and Support page lets you create a BRIDGE LIVE IP log file, which can be useful for troubleshooting by AJA Support. The report contains system information, pipeline configuration information, pipeline error messages, and system logs.

To access the page, select **Diagnostics & Support** from the Setup menu in the upper right area of Dashboard. An informational screen will be displayed.

Figure 56. Diagnostics and Support Screen



To create the report, click **Create and download diagnostic report**. The diagnostic report will download as a '.tar' file to the 'downloads' folder on your computer. The .tar file can be sent to AJA for assistance with troubleshooting.

Logs are stored on the server in the following folder:

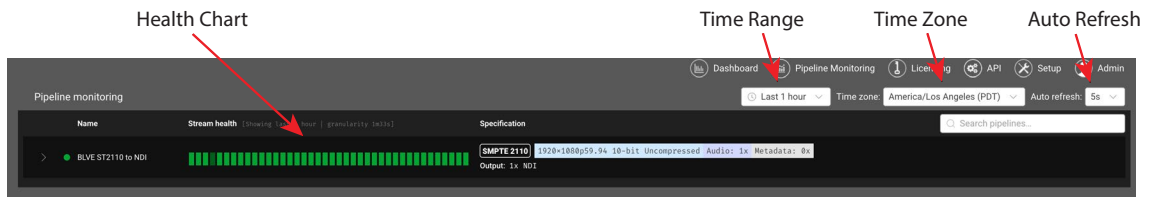
/opt/transcoder/transcoder/logs/

If you need to send logs to AJA Support, please copy the contents of the folder, archive them and share.

Pipeline Monitoring

The Pipeline Monitoring page allows for configuration of monitoring parameters and monitoring of pipelines in overview or detail mode.

Figure 57. Pipeline Monitoring



Time Range

Sets the time range for all time-series data (the health charts and the pipeline events table).

Figure 58. Time Range Selector

Absolute time range	
From	now-1h
To	now
<button>Apply time range</button>	
Last 5 minutes Last 15 minutes Last 30 minutes Last 1 hour Last 3 hours Last 6 hours Last 12 hours Last 24 hours	

It also determines how much time each bar in the health charts covers so the wider the range, the more time each bar spans. Choose either a relative or an absolute range:

- A relative range is built from the keyword now, optionally followed by a minus sign and a duration written as N followed by a time unit—s, m, h, d, w, or y for seconds, minutes, hours, days, weeks, or years—where N is a positive integer (for example, now-1h).
- An absolute range can be picked from the date picker or entered manually in the format YYYY-MM-DD HH:MM:SS (note the space between the date and the time).

Time Zone

Sets the time zone with an autocomplete search to help find the correct timezone.

Auto Refresh

Sets how often the data reloads automatically. This control may be toggled off.

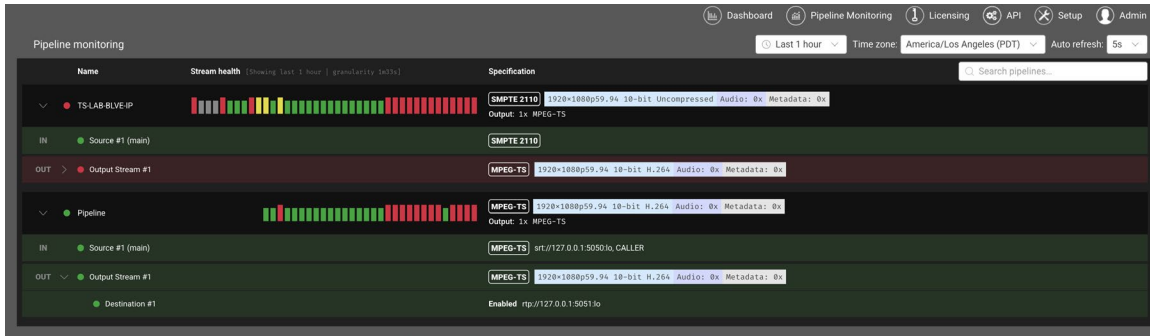
Health Chart

A health chart is a bar chart showing the health state of a pipeline or stream over time. Each bar covers a fixed span of the selected time range, and hovering over a bar shows the time that span begins. This span length is the chart's granularity, and it's derived from the selected time range — a wider range means each bar covers more time. For example, a 5-minute range produces bars of roughly 8 seconds each, while a 1-hour range produces bars of roughly 93 seconds each. The current granularity is shown in two places: after "Stream health" in the overview table header, and above the overall pipeline health chart on the detail page.

Overview Page

Pipelines are listed in a table, one per row, with each row showing the pipeline's name, health chart, and specification.

Figure 59. Pipeline Monitoring Overview Page

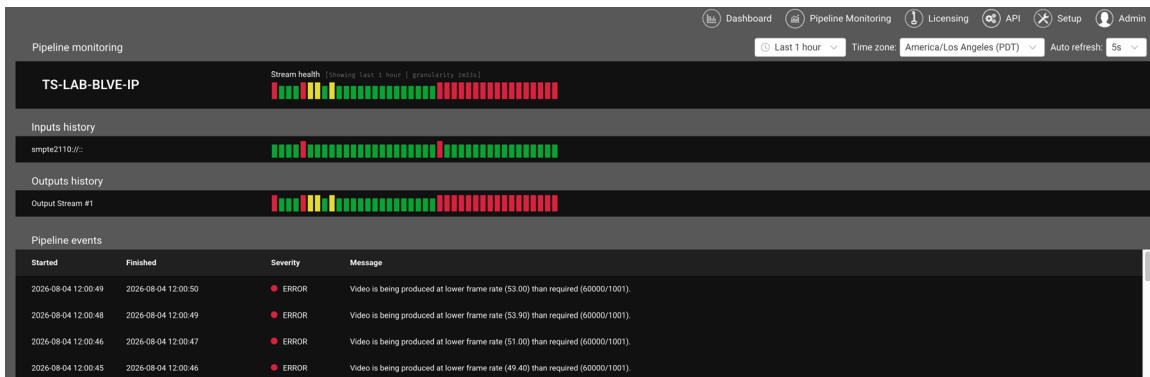


Expanding a pipeline row reveals its input and output streams as their own rows, and expanding an output stream row shows all of that stream's destinations. A circular status dot next to each name indicates the real-time health of the pipeline or stream; for input and output streams, the row's background color reflects the same state. Clicking a pipeline row opens its detail page.

Pipeline Detail Page

This page shows information about a specific pipeline, identified by its name in the top left. Click on the pipeline name to display details.

Figure 60. Pipeline Monitoring Detail Page



It displays several health charts—one for the pipeline's overall health, plus one for each input and output stream—and, below them, a table of pipeline events. Each event has a time range in which it occurred, a severity, and a text message. Its Started or Finished timestamp may show N/A, meaning the event began or ended outside the selected time range. If the range's To value is set to now and the Finished timestamp is N/A, the event is still ongoing.

Admin Menu

Functions available in the Admin Menu can be used for system management functions, including restarting all pipelines, and rebooting or shutting down the BRIDGE LIVE IP unit. See ["Admin Menu" on page 22](#) for more information.

Pipeline Configuration

About Pipelines

A pipeline is a configured network communications path defining necessary signal stream information. Each pipeline has an Input Stream and at least one Output Stream, which specify various parameters that are configured to define the functionality of that pipeline. Each Output Stream also has an Output Stream Destination, which further defines that Output Stream target and capabilities.

Various parameters are available, depending on the choice of Input Stream, Output Stream, Destination, and Use Case. During the pipeline configuration process the BRIDGE LIVE IP UI displays only the parameters applicable to the options that you have selected.

Because of the progressive definition of a pipeline, the order of the configuration steps you perform is important. For example, some pipeline settings can be set automatically when a pipeline is first created, but only if an active source is already present and detected. If that source is not available, additional manual configuration settings, subject to human error, will be required. Following the general procedure described here can help you efficiently and successfully configure your BRIDGE LIVE IP with the pipelines needed for your workflows.

Saving, Starting, and Stopping Pipelines

Once created, each pipeline must be saved before it can be used. When a pipeline is started, it activates that network signal path, transporting video from the selected source to the desired destination. Pipelines continue to operate as long as the input source and output destination(s) are present and valid.

Currently active pipelines will be automatically restored to operation when the BRIDGE LIVE IP unit is reset, rebooted, or power cycled. All pipeline configurations are also retained, but inactive pipelines are not automatically re-activated under those circumstances.

General Procedure for Creating a Pipeline

Overview

The following procedures describe the basic steps required to create an entirely new pipeline. You will make choices regarding transport streams, protocols, and codecs to meet your encoding requirements. These choices dynamically affect which sets of configuration options become available as you build your pipeline.

NOTE: *Because different parameter settings are required depending on the type of pipeline being created, cross references are provided to manual locations explaining specific settings.*

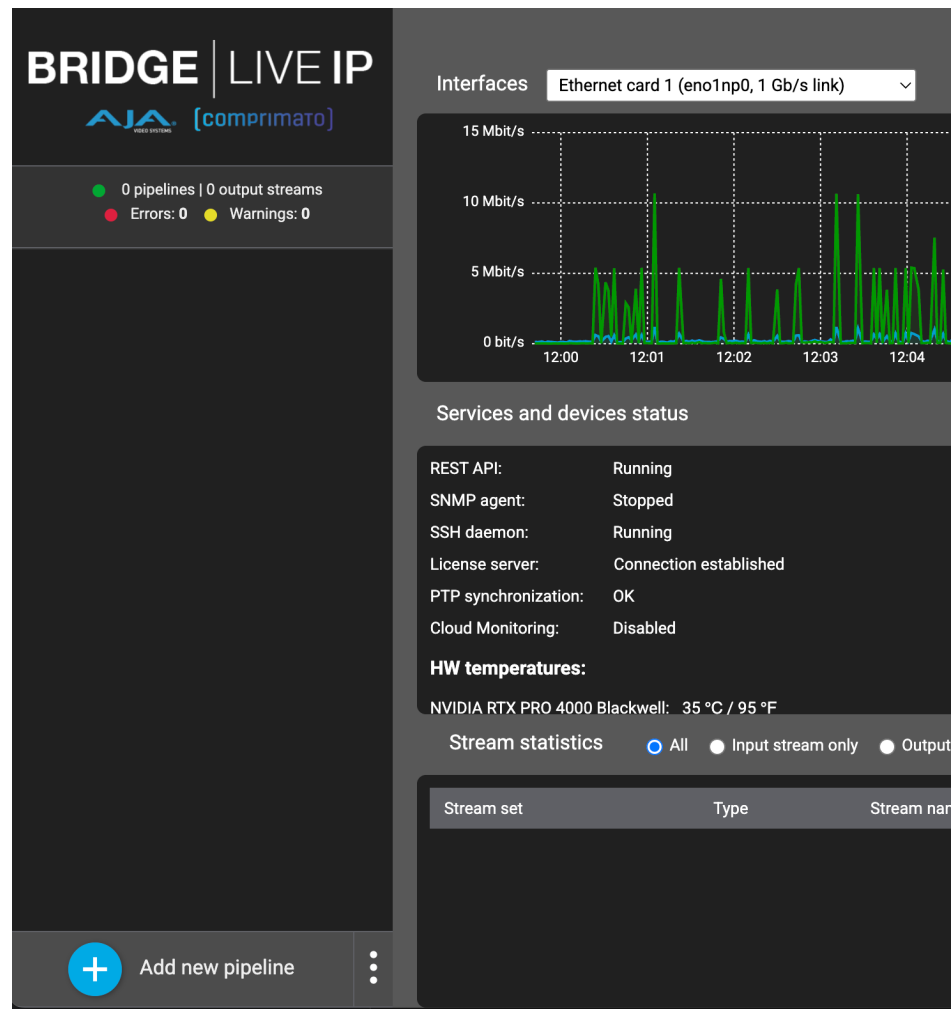
Identifying Your Encoding Requirements

Before you begin, consider which of the following components match your requirements. See "[Encoding and Decoding Protocols Supported](#)" on page 9 for available options.

Add New Pipeline

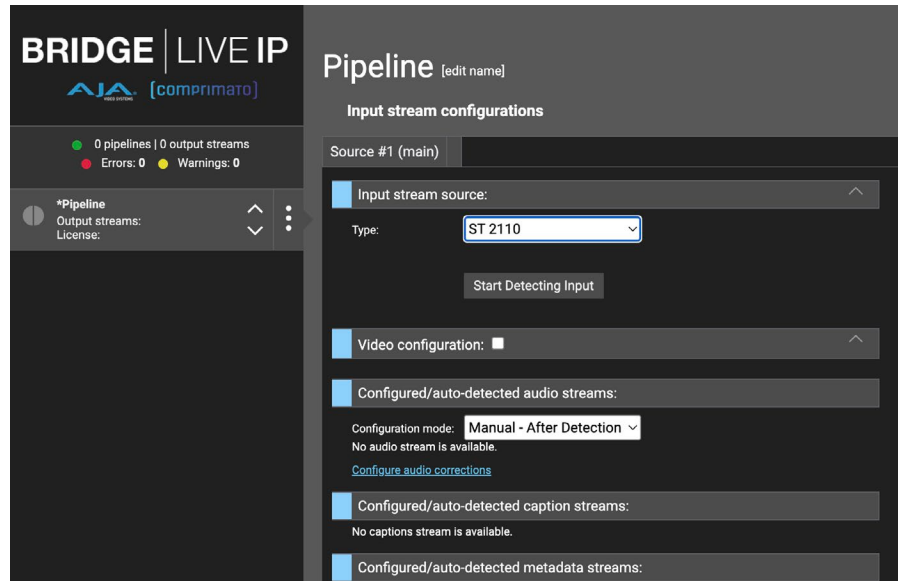
1. From the BRIDGE LIVE IP Dashboard, click **Add new pipeline** at the bottom of the Pipeline pane in the lower left corner.

Figure 61. Add New Pipeline Button



2. Dashboard will display a page with Input stream configuration options.

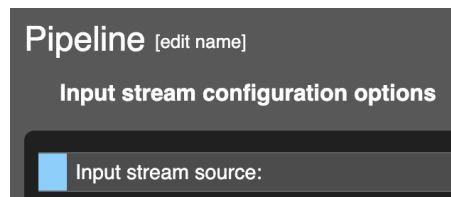
Figure 62. Input Stream Configuration Options



Naming the Pipeline

- From the top of the **Input stream configuration options** column, click **[edit name]**, found immediately to the right of the text "Name your pipeline."

Figure 63. Edit Name Button



- The Edit Pipeline Name pop-up window displays. The default name is "Pipeline".

Figure 64. Edit Pipeline Name Pop-up Window

10.6.125.2 says

Edit pipeline name (max 128 characters):

Pipeline

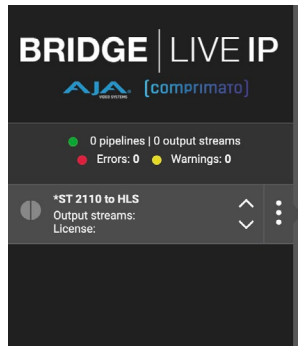
Cancel
OK

- Click in the box and enter a name for your new pipeline.

NOTE: Pipeline names are limited to 128 characters. An error message is displayed if you try to enter too many characters, and you will not be able to save the name.

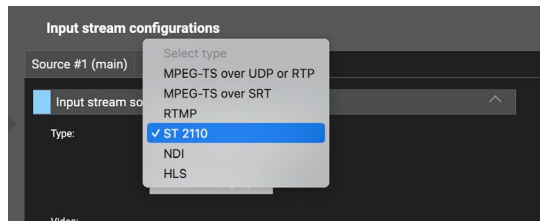
- After clicking OK, the new pipeline will be shown in the left column of Dashboard. Both half circles are gray indicating that the pipeline is not configured or active yet.

Figure 65. Named Pipelines



Selecting Input Stream Type

Figure 66. Input Stream Type Selection



The rest of the configuration procedure depends on the Type of Input stream you select. Click on the Type box, and select your desired Input stream type. Example procedures are included for the following types:

- ST 2110 (see ["Configuring an ST 2110 Input Stream" on page 55](#))
- NDI (see ["Configuring an NDI Input Stream" on page 56](#))
- RTMP (see ["Configuring an RTMP Input Stream" on page 58](#))
- MPEG TS (see ["Configuring an MPEG TS Input Stream" on page 61](#))

Configure Input Stream Options

BRIDGE LIVE IP supports automatic population of the input codec and signal format when receiving MPEG-TS streams. Once the Input Stream Source is configured, select 'Start Detecting Input'. Once the signal is detected, the 'Auto Detected Video streams' section will show a summary of the incoming signal. Select 'Set as Input'. The detected input will now automatically populate the codec and all associated formats. There should be no need to further configure the incoming signal. The manual steps to configure MPEG-TS Input streams are still included in the manual. Consult the Reference section for configuration and feature details.

Configuring an ST 2110 Input Stream

NOTE: Procedure continued from the conclusion of ["Selecting Input Stream Type" on page 55](#).

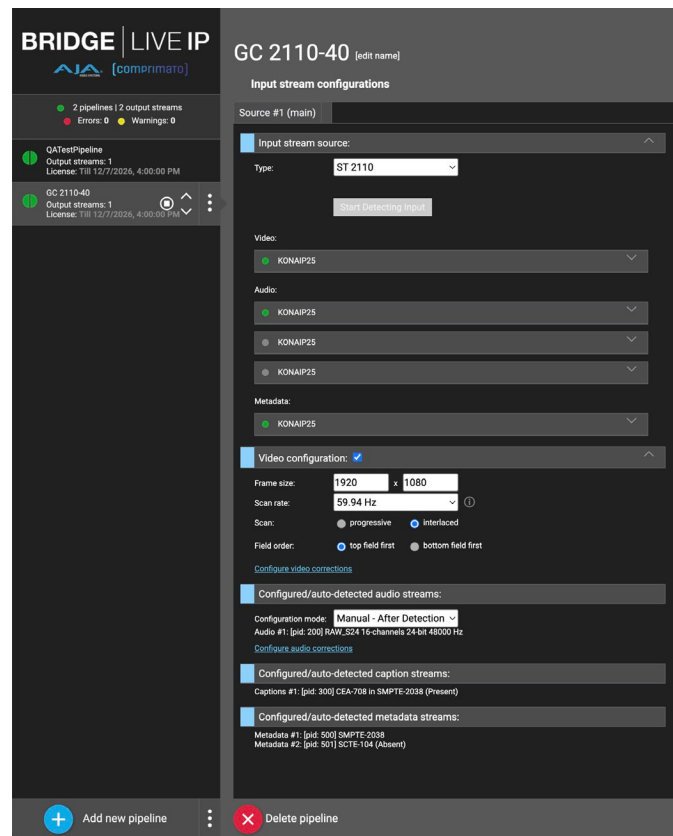
In order to register the BRIDGE LIVE IP in NMOS, ST 2110 input must be selected. Once selected, the device will appear in the NMOS registry after clicking either **Start Detecting Input** or saving the pipeline.

If the NMOS software isn't IS-04 compatible, then the NMOS API is available in REST API call: <http://yourserver-IP:80/x-nmos>

The name of the device reflects the name of the pipeline. This can be edited by clicking edit name next to the pipeline name.

Video, Audio, Ancillary stream input sources should be auto-detected along with their characteristics such as video resolution, audio channels, etc.

Figure 67. Auto-populated Characteristics of the ST 2110 Input signal



7. This completes the pipeline's Input stream configuration.

Go to ["Add New Output Stream to Pipeline" on page 61](#) to continue this procedure.

Configuring an NDI Input Stream

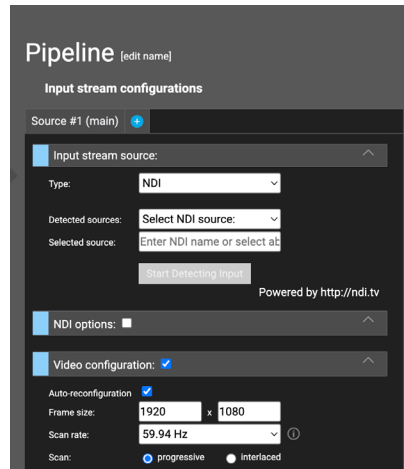
NOTE: NDI is a paid for feature which much be purchased and have the license activated on the BRIDGE LIVE IP server. The BLVE-NDI license is non-transferable. BRIDGE LIVE IP supports NDI 10-bit.

NOTE: Procedure continued from the conclusion of ["Selecting Input Stream Type" on page 55](#).

NOTE: This procedure assumes an NDI system is already present and operating on the network, using standard NDI auto-discovery. See ["NDI Discovery Servers" on page 30](#) for information about using an NDI Discovery server instead.

After selecting the NDI Input stream type, you need to configure the input stream's parameters.

Figure 68. NDI Input Stream Example

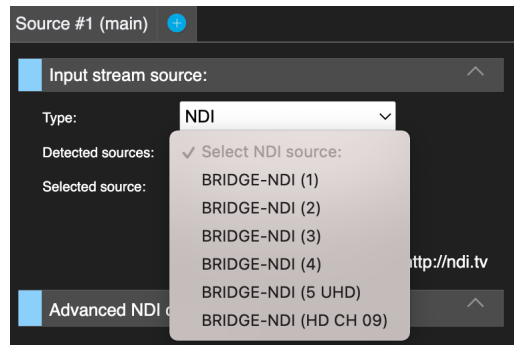


1. Click on **Select NDI Source** in the "Detected sources" box. A list of the discovered NDI sources will be displayed.

NOTE: Only the names of currently active NDI sources will be available for selection.

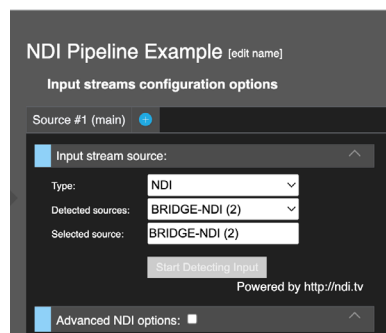
NOTE: The NDI source can also be entered manually. The name entered must exactly match the actual NDI source.

Figure 69. NDI Detected Sources



2. Click on the desired NDI source. That source name will be displayed in the "Detected sources" and "Selected source" boxes.
3. Click on the **Start Detecting Input** button. An "Auto-detected video streams" heading appears displaying the detected NDI video format. The left half of that pipeline's status will also be colored green.

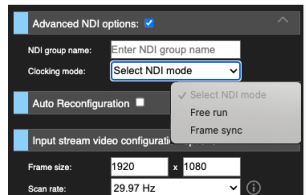
Figure 70. NDI Detected Video Format



4. Click on the **Set As Input** button. Additional information about that NDI source will be displayed in the "Input stream video configuration options" pane.

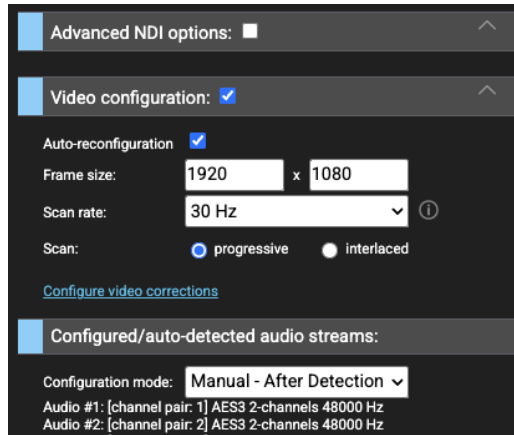
IMPORTANT: Both the Start Detecting Input and Set As Input buttons need to be clicked if you want to use the automatically detected source video format for this input signal.

Figure 71. Advanced NDI Options



5. You may select the sync mode for NDI input:
 - Frame Sync (default). Synchronises both video and audio using the local clock. Audio is re-sampled and video is duplicated/dropped if needed.
 - Free-Run. Synchronises video to the audio. This may drop video frames in order to resync

Figure 72. Auto-populated Characteristics of the NDI Input signal



6. This completes the pipeline's Input stream configuration.
Go to ["Add New Output Stream to Pipeline" on page 61](#) to continue this procedure.

Configuring an RTMP Input Stream

NOTE: Procedure continued from the conclusion of ["Selecting Input Stream Type" on page 55](#).

IMPORTANT: RTMP source clients must be configured with a video format compatible with BRIDGE LIVE IP. For example, 720p 30 is not a SMPTE standard and is not supported by BRIDGE LIVE IP. See ["Appendix A Specifications"](#) for a listing of supported video formats.

About RTMP Streaming

Configuring an RTMP input on BRIDGE LIVE IP differs somewhat from configuring other IP video stream inputs because RTMP requires a stream key. Typically the stream key follows the / after the IP address:

rtmp://<IP Address>/live/<Stream Key>

The BRIDGE LIVE IP pipeline's RTMP input must be configured with a stream key, and also be running, before the external RTMP client (source) that has been configured with that same stream key is started. When that source stream starts, it finds the matching key for that BRIDGE LIVE IP's running RTMP pipeline's input

stream, and can then complete the streaming connection. With that connection established, you can then set the video settings for that BRIDGE LIVE IP pipeline, and continue configuring that pipeline's output stream(s). BRIDGE LIVE IP actually provides three methods of stream key configuration (see "[RTMP \(Input and Output\)](#)" on page 89).

This example procedure assumes an external RTMP source device is available on the network, you can change the configuration settings for that RTMP source, and you can turn that external source stream off and on.

1. After selecting the pipeline's input stream type, you now need to configure the input stream's parameters.

Figure 73. RTMP Input Stream Example

The screenshot shows the 'RTMP Pipeline Example' configuration window. Under 'Input stream configurations', 'Source #1 (main)' is selected. The 'Input stream source' dropdown is set to 'RTMP'. The 'RTMP stream key' field is empty, with a 'Generate random' button next to it. Below, the 'Input RTMP URL(s)' field shows two example URLs: 'rtmp://10.3.111.107:1935/live/****stream-key***' and 'rtmp://127.0.0.1:1935/live/****stream-key***', each with a 'Copy' button. A 'Start Detecting Input' button is at the bottom.

2. Click on the Generate Random button to create a unique stream key.

Figure 74. RTMP Input Stream Key Generated

The screenshot shows the same configuration window, but now the 'RTMP stream key' field contains a generated key: '1d704420-d7de-4c7f-b8ef-136ae0bc28fd'. The 'Generate random' button is still present. The 'Input RTMP URL(s)' field now shows two URLs incorporating this key: 'rtmp://10.6.125.2:1935/live/1d704420-d7de-4c7f-b8ef-136ae0bc28fd' and 'rtmp://127.0.0.1:1935/live/1d704420-d7de-4c7f-b8ef-136ae0bc28fd', each with a 'Copy' button. The 'Start Detecting Input' button remains at the bottom.

3. Click on the **Copy** button of the RTMP stream URL you wish to use.
4. Go to the RTMP source stream configuration application and paste in that URL and stream key, as required for that application.

NOTE: Do not turn on the external RTMP source stream yet.

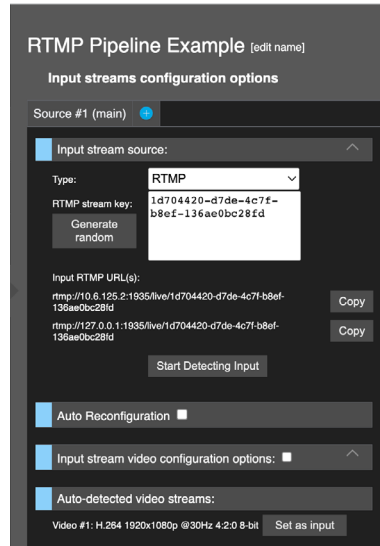
5. Click on the **Start** button at the bottom left of the BRIDGE LIVE IP UI.

Figure 75.



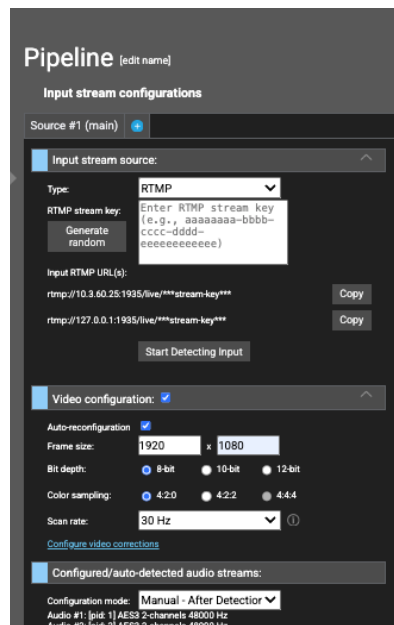
6. Now start the external RTMP source stream. The left side of the status circle for that pipeline will be colored green.

Figure 76. RTMP Stream Connection Initiated



7. Click on the **Start Detecting Input** button. An "Auto-detected video streams" heading appears displaying the detected video format. The left half of that pipeline's status will remain colored green.
8. Click on the **Set As Input** button. Additional information about that source will be displayed in the "Input stream video configuration options" pane.

Figure 77. RTMP Input Stream Key Generated



IMPORTANT: Both the *Start Detecting Input* and *Set As Input* buttons need to be clicked if you want to use the automatically detected source video format for this input signal.

9. This completes the pipeline's Input stream configuration.

Go to ["Add New Output Stream to Pipeline" on page 61](#) to continue this procedure.

Configuring an MPEG TS Input Stream

NOTE: Procedure continued from the conclusion of "[Selecting Input Stream Type](#)" on [page 55](#).

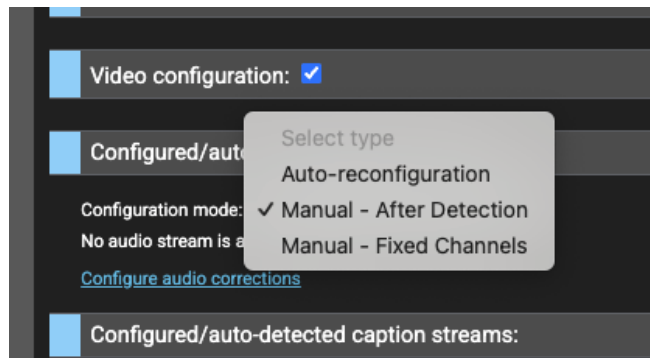
The Input Stream IP address field will autopopulate with the first IP of the selected NIC. You may also specify a different valid IP address.

NOTE: The Input Stream IP address field will autopopulate with the first IP of the selected NIC. You may also specify a different valid IP address.

Input Stream Audio Detection

BRIDGE LIVE IP supports input stream audio detection.

Figure 78. Input Stream Audio Detection



Under Configured/Auto-Detected Audio Streams, choose from the following options:

- Auto Reconfiguration - Reconfigures audio if the incoming audio stream changes.

NOTE: There may be certain scenarios where this does not resolve the audio mapping.

- Manual-After Detection - Once audio stream is detected, the applied settings will be maintained even if the incoming audio stream changes. If an assigned audio channel input disappears, silence is inserted meaning the audio samples amplitude is 0 but bitrate is still present.
- Manual-Fixed Channels - Only supported for NDI inputs. Allows for manually setting audio input channels before audio detection. The mapping will remain as set, regardless of input changes. If an assigned audio channel input disappears, silence is inserted meaning the audio samples amplitude is 0 but bitrate is still present.

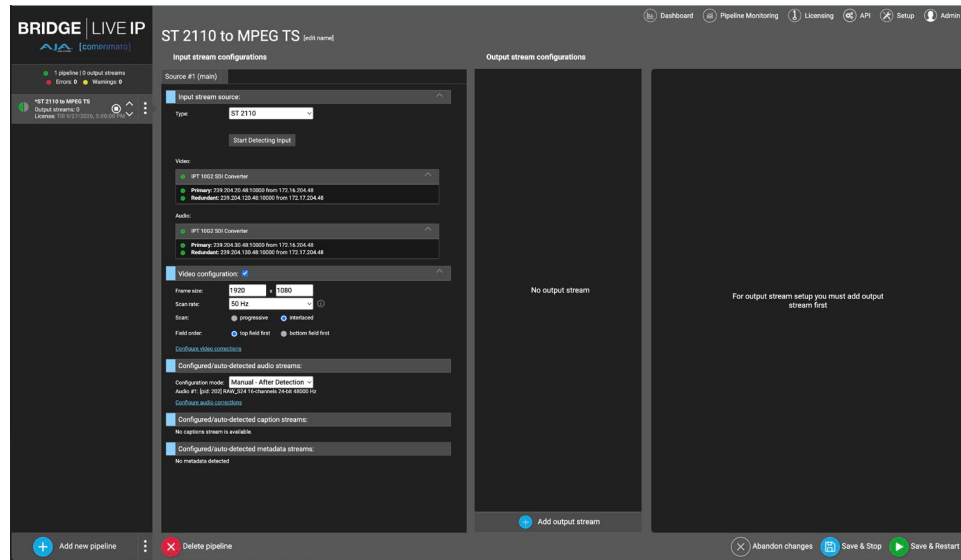
Add New Output Stream to Pipeline

NOTE: Procedure continued from the conclusion of "[Configure Input Stream Options](#)" on [page 55](#) for your selected Input Stream Type.

After you have configured your pipeline's Input stream, and a valid signal has been detected, you now can now easily configure your pipeline's Output stream(s).

During initial pipeline configuration the Dashboard will indicate that the currently selected pipeline lacks any output streams.

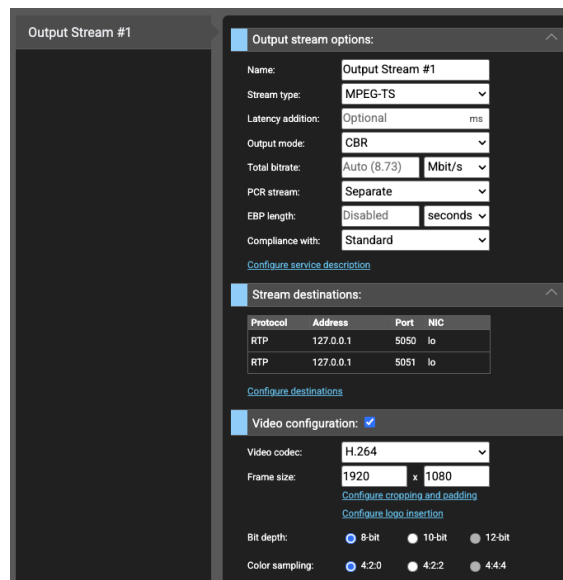
Figure 79. Pipeline Without Output Stream



Adding an Output Stream

1. Click on **Add output stream** at the bottom of the Output Stream Mapping pane. New fields display in the Output stream column on the right side of Dashboard for naming and configuring your new output stream. Some of the fields of the Output stream column are auto-populated, matching the detected Input stream

Figure 80. MPEG-TS Output Stream Added with an Input Stream Source Detected

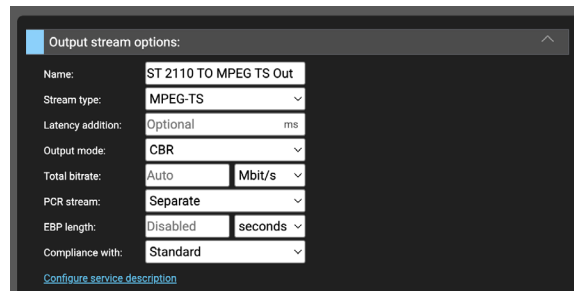


NOTE: If no valid Input stream is detected, you can manually enter data into empty fields, but will need to know exactly what that pipeline's input values will be when that input is activated. Having an already active input stream greatly simplifies the initial configuration process.

Naming the Output Stream

2. Under Output stream options, enter a name in the Name field. Create a name that will be descriptive to your users for this specific output stream.

Figure 81. Output Stream Naming

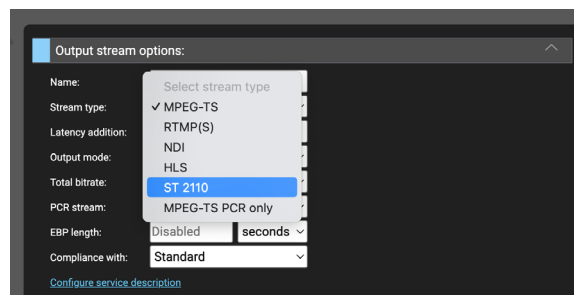


NOTE: The name of the Output Stream is intended for user convenience and does not affect signal transport operation. However, it is important that Input and Output Stream names be descriptive enough so users can distinguish between them, especially when multiple streams are being configured for simultaneous operation.

Selecting Output Stream Type

1. Click on the Stream Type box and select your desired Output stream type.

Figure 82. Output Stream Type Selection



2. After creating, naming, and selecting the pipeline's Output Stream type, you can configure the audio (if any) to be included in the output stream.

NOTE: If you want to use a hostname instead of an IP address in the URL, you need to set an appropriate DNS server. If it is in the external network, the set Default route needs to have access to the Internet. Both can be done in the Setup. For more information, see "Initial System Setup Process" on page 18.

Manual Low Latency Adjustments

Latency addition is the offset applied to the PTS for reliable transmission to the receiving decoder. The offset is calculated by the overall configuration of the pipeline. The latency addition field allows for the manual adjustment of this offset. This field is available on all MPEG-TS outputs within BRIDGE LIVE IP.

Figure 83. Latency Addition



It is recommended to obtain a baseline figure before adjusting the latency addition manually using the BRIDGE LIVE IP REST API:

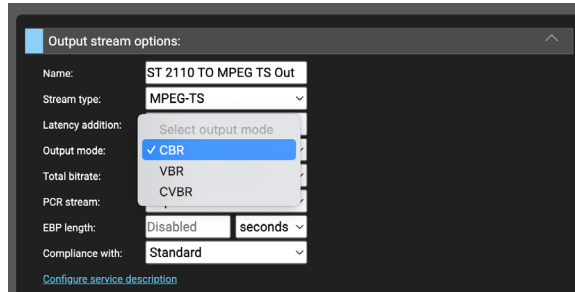
- Use the following GET command to obtain the pipeline statistics when a pipeline is active: `http://hostIpAddress/api/pipeline/0/state`
 - Look for the field “transcodingLatency”
- Transcoding Latency is the real time figure of the pipeline. The latency addition cannot be set lower than this.
- It is recommended to add 40-50ms+ of the transcoding latency in the Latency Addition field and restart the pipeline.
- It is best to test using complex content, as this will need more time to encode. If frame drop errors are noticed then the Latency Addition will need to be increased.

Selecting Output Mode and Total Bitrate

For some output types, output mode (CBR, VBR, CVBR) can be specified for individual Output streams. This removes the need for CBR and VBR ini files.

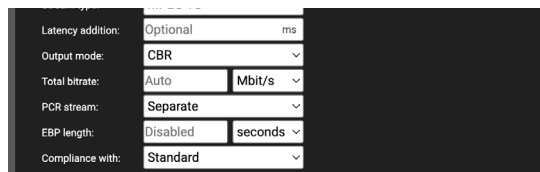
Under Output Stream Options, click on Output Mode and select from available options.

Figure 84. Output Mode Selection



If CBR or CVBR is selected, a **Total Bitrate** field will also be displayed (hidden for VBR). The default is **Auto** and **Mbit/s** but can be manually set with a value and unit changed for bits, kbits, or Mbits.

Figure 85. Total Bitrate Field



NOTE: If a manual bitrate is entered which is insufficient to support the configured signal path, an error will be presented.

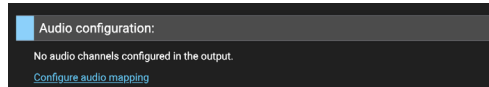
Configure Audio Mapping

By default a newly created pipeline will not include any audio in the output stream. You must manually map incoming audio channels to the output stream.

NOTE: Some RTMP streaming services will not accept streams without audio.

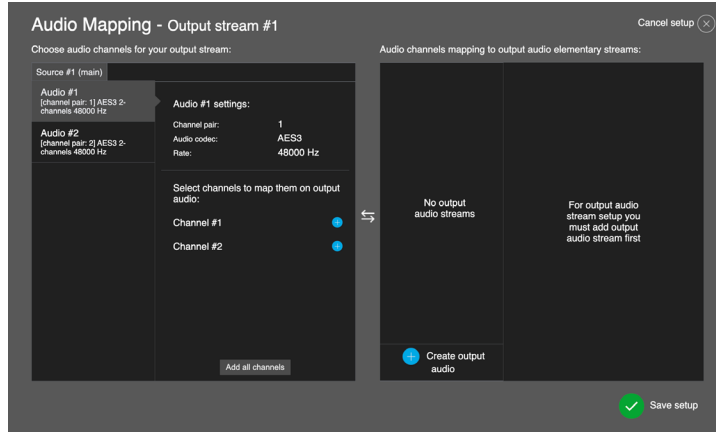
1. Click on **Configure Audio Mapping** near the bottom of the Output Stream pane.

Figure 86. Change Audio Mapping Button



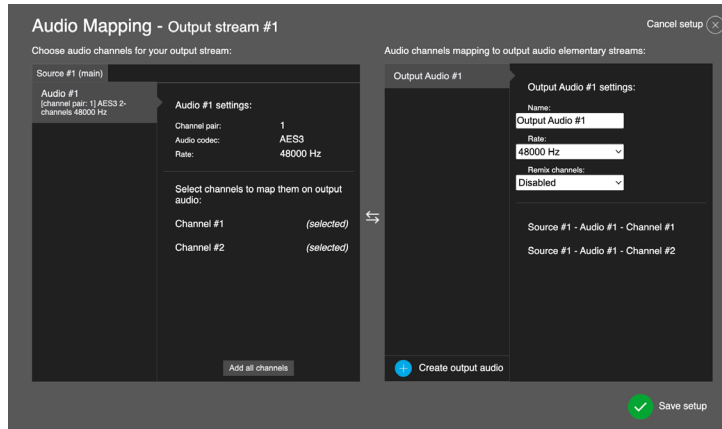
2. A screen will appear displaying the available incoming source audio.

Figure 87. Audio Mapping Window, No Output Stream Audio



3. In order to add the incoming audio to the output, select a desired audio pair to send to the output. Then select **Add all channels**. This will add the two channels in the selected pair to the output section of the Audio channel selector. The audio channels can then be inserted into the desired output audio pairs. If more than 1 pair of audio mapping is needed, repeat the above procedure for each needed pair.

Figure 88. Output Stream with 2 Channels

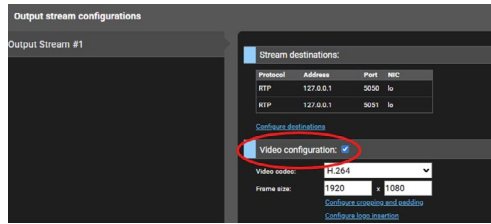


4. You can name that audio output stream, and adjust other audio related settings for conversion.
5. Click on the **Save Setup** button. The window closes.
6. You can now configure additional Output Stream Options. Different options are available, depending on the Output Stream Type. Follow the link below to the appropriate sub-procedure for your Output Stream Type:
 - NDI (go to ["Configuring an NDI Output Stream" on page 68](#))
 - MPEG-TS (go to ["Configuring an MPEG-TS Output Stream" on page 69](#))

Audio Only Output

By default, most Output Stream types send video and audio but Audio only output is also supported. Unchecking **Video Configuration** in an output stream will remove the Video component and allow for an Audio only stream to be sent.

Figure 89. Audio Only Output



Configuring a ST 2110 Output Stream

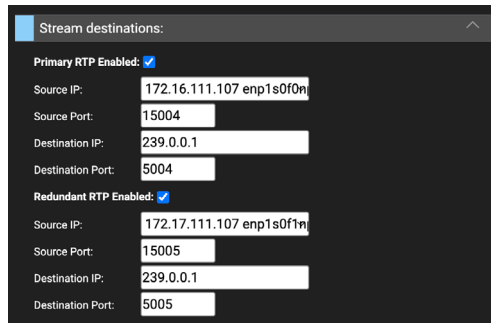
NOTE: Procedure continued from the conclusion of ["Selecting Output Stream Type" on page 63](#).

1. After selecting ST 2110 as the output stream type and with a valid Input stream source detected, specify the Flow Type (Video, Audio, Metadata)

ST 2110 Stream Destinations

Verify configurations of ST 2110 destinations in the Stream Destinations panel.

Figure 90. ST 2110 Stream Destinations



Primary RTP

Enable to specify primary stream destination.

Redundant RTP

Enable to specify secondary stream destination for ST 2022-7 seamless protection switching.

Source IP

Dropdown menu to select the network SFP interface by its assigned IP address.

Source Port

Field to specify the source port for output streaming.

NOTE: Both source and destination ports can be auto-assigned. The pipeline start will revert to the selected port configuration.

Destination IP

Can be configured for either unicast or multicast.

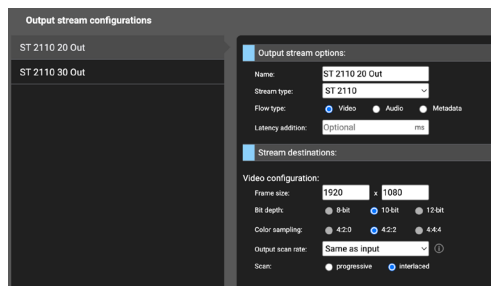
Destination Port

Field to specify the destination port for transmitted packets.

ST 2110 Output Video Flows

For video flows, fields are auto-populated with values from the incoming signal video format.

Figure 91. ST 2110 Video Flow Output



Supported output frame sizes include::

- UHD
- QHD
- FullHD
- HD

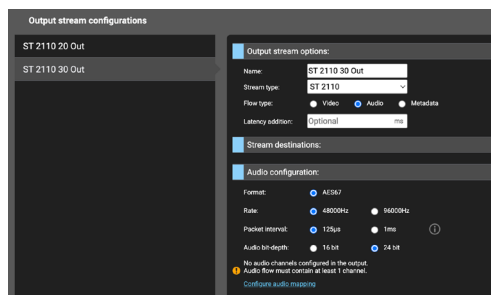
BRIDGE LIVE IP supports 10-bit depth and 4:2:2 color sampling. All frame size options can be configured for either progressive or interlaced output.

ST 2110 Output Audio Flows

For audio flows, audio mapping must be configured. Click on Configure Audio Mapping to specify audio channels to add and groups to configure.

For audio configuration, at least one audio channel must be specified in the **Configure Audio Mapping** dialog. Additional configurations for standard Conformance Levels (A/AX, B/BX, C/CX) depend on the selected rate, packet interval, and audio bit depth.

Figure 92. ST 2110 Audio Flow Output



ST 2110 Output Metadata Flows

For metadata flows, metadata stream must be specified.

Figure 93. ST 2110 Metadata Flow Output

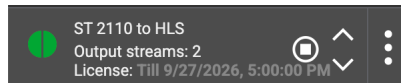
2. Click on **Save and Restart** at the bottom of the screen.

Figure 94. Save & Restart button



3. The ST 2110 output will be activated, and both circles for that pipeline status will be colored green.

Figure 95. Pipeline Status



Configuring an NDI Output Stream

NOTE: NDI is a paid for feature which much be purchased and have the license activated on the BRIDGE LIVE server. The BLVE-NDI license is non-transferable.

NOTE: BRIDGE LIVE IP supports 10-bit NDI and Manual HDR metadata entry on transmit.

NOTE: Procedure continued from the conclusion of ["Selecting Output Stream Type" on page 63](#).

1. After selecting NDI as the output stream type with a valid Input stream source detected, the following parameters are displayed by default. It will be auto-populated with the incoming signal video format.

Figure 96. Output Stream, NDI Defaults

The screenshot shows the 'Output stream options' panel. The 'Name' field is 'Output Stream #1'. The 'Stream type' is set to 'NDI'. The 'Latency addition' is 'Optional' ms. Below this is the 'Stream destinations' panel with 'NDI name' set to 'ndi'. The 'NDI options' panel is empty. The 'Video configuration' panel is checked and shows 'Frame size' as 1920 x 1080, with links for 'Configure cropping and padding' and 'Configure logo insertion'. 'Bit depth' is set to 10-bit. 'Output scan rate' is 'Same as input'. 'Scan' is set to 'progressive'.

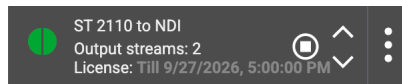
2. Enter a descriptive name for the NDI Output stream.
3. Click on **Save and Restart** at the bottom of the screen.

Figure 97. Save & Restart button



4. The NDI output will be activated, and both circles for that pipeline status will be colored green.

Figure 98. Pipeline Status



5. This completes the procedure for creating an NDI pipeline.

NOTE: When this NDI Output stream is active, its name will appear in all other pipeline NDI Input stream Detected Sources lists, becoming available for selection. When that NDI Output stream is stopped, its name will be removed from all pipeline selection lists.

Configuring an MPEG-TS Output Stream

NOTE: Procedure continued from the conclusion of "Selecting Output Stream Type" on page 63.

About Port Numbers

Ethernet port numbers can be used to direct network communications to a specific application associated with a destination Network Interface Card (NIC). Specifying a port number is required for network communications, and default port numbers are often used.

A NIC configured with a specific IP address may communicate with multiple applications at the same time. Because each NIC has only one IP address, defining a unique port number in the sent message packets can direct the communications to the correct receiving application using that port number.

Numbering conventions exist defining ranges of port numbers, but generally all that is required is to have the port numbers of the sending and receiving message packets match each other.

About Loopback

Loopback is a special Ethernet configuration used for internal network traffic, and is commonly used for pre-testing network settings. Loopback can be useful to protect the network from excessive or inappropriate data traffic during network configuration. The localhost (127.0.0.1) IP address can be used to communicate only with your local computer.

1. After selecting MPEG-TS as the Stream type with a valid Input stream source detected, the following parameters are displayed by default. It will be auto-populated with the detected incoming signal video format.

Figure 99. Output Stream, MPEG-TS Defaults

Output stream options:

Name:

Output Stream #1

Stream type:

MPEG-TS

Latency addition:

Optional

ms

Output mode:

CBR

Total bitrate:

Auto (8.73)

Mbit/s

PCR stream:

Separate

EBP length:

Disabled

seconds

Compliance with:

Standard

[Configure service description](#)

Stream destinations:

Protocol	Address	Port	NIC
RTP	127.0.0.1	5050	lo
RTP	127.0.0.1	5051	lo

[Configure destinations](#)

Video configuration:

☒

Video codec:

H.264

Frame size:

1920

x

1080

[Configure cropping and padding](#)

[Configure logo insertion](#)

Bit depth:

☐ 8-bit

☒ 10-bit

☐ 12-bit

Color sampling:

☐ 4:2:0

☒ 4:2:2

☐ 4:4:4

Video bitrate:

8

Mbit/s

Output scan rate:

Same as input

Scan:

☒ progressive

☐ interlaced

Wrap captions:

None

Output PID:

Enter output PID

H264 encoding configuration:

Coding:

CABAC

Profile:

High

GOP size:

120

frames

B count:

2

frames

Audio configuration:

No audio channels configured in the output.

[Configure audio mapping](#)

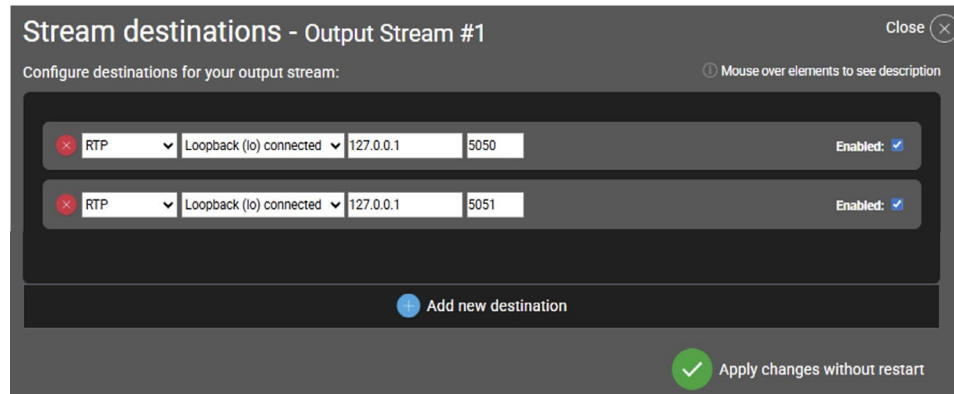
Metadata configuration:

No metadata stream configured in the output.

[Configure metadata mapping](#)

2. In Stream Destination field, click on **Configure Destinations**.

Figure 100. Configure Destinations Dialog



3. In the dialog that appears:
 - Choose RTP, UDP, SRT, or RTMP and enter relevant details for the connection.
 - For RTP or UDP configuration, see ["RTP or UDP Output Stream Destination" on page 72.](#)
 - For SRT configuration, see ["SRT Output Stream Destination" on page 72.](#)
4. On the right side of each stream destination, an **Enabled** button is checked by default. If the **Enabled** button is unchecked, the selected destination stream will stop, without impacting other streams. This is applied when the **Apply changes without restart** is selected.

NOTE: Similarly, new destinations can be added to the Output Stream and activated without requiring a restart of the pipeline.

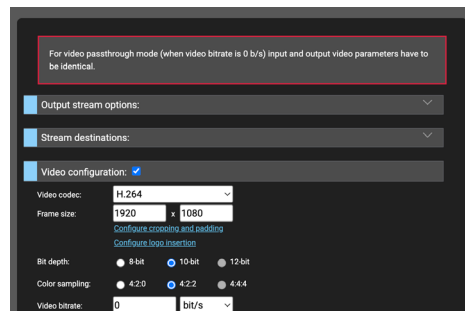
MPEG-TS Video Passthrough

BRIDGE LIVE IP has the ability to pass through MPEG-TS without decoding or encoding the video. This is known as video passthrough. This is useful for operators that wish to re-encapsulate to/from SRT/UDP/RTP or use BRIDGE LIVE IP as a one to many device, somewhat like a video IP router.

To configure video passthrough, select "Start Detecting Input", BRIDGE LIVE IP will detect what the incoming streams video parameters are. Then select "Set As Input" under the Auto Detected Video Streams. Now when an output stream is created, the video settings will be applied automatically. These will need to be the same as the input to allow for video passthrough. To finish the configuration apply a video bitrate of 0 under the output video configuration settings, and input a total bitrate for the transport stream under the output stream options.

If the output settings for the video are not the same, the following warning will be seen:

Figure 101. Video Passthrough Warning



Multiple destinations can be configured to allow a one to many use case. Transport stream encapsulation can also be changed.

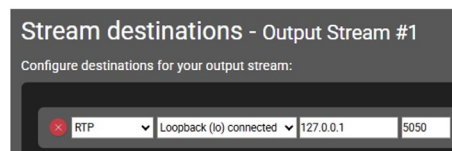
RTP or UDP Output Stream Destination

The BRIDGE LIVE IP's RTP and UDP Output Stream Destination parameters are identical.

This sub-procedure demonstrates using Loopback to internally test the pipeline's network settings, using default settings.

1. Open the Configure Destinations dialog from "[Configure Destinations Dialog](#)" on page 71.
2. Enter the desired IP address for your Output stream destination. In this example the default 127.0.0.1 (localhost) IP address is used for testing.
3. Enter the desired port number. In this example use the default port **5050**.
4. Under NIC, select Ethernet card or Loopback. In this example use the default **Loopback I/O Connected** setting for testing. The remaining default settings can be used for this test only pipeline configuration.

Figure 102. Loopback Example, Default Settings



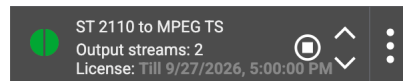
5. Click on **Apply changes without restart** and Close the dialog.
6. Click on **Save and Start** at the bottom of the Output Stream Configurations home page.

Figure 103. Save and Start



7. The pipeline will be activated and loopback the signal through only the NIC card. When the path is complete and active, both halves of the Status circle for that pipeline will go green.

Figure 104. Pipeline Status



8. This completes the procedure for creating a pipeline that demonstrates Loopback operation for testing.

Stream to the Network Instead of Loopback

To configure and run an actual network stream, instead of loopback, select an Output Stream Ethernet Card, enter the desired IP address and Port number, and click **Save & Restart**.

SRT Output Stream Destination

About SRT Operating Modes

NOTE: SRT encode and decode are only utilized with MPEG-TS streams.

BRIDGE LIVE IP supports two SRT stream modes of operation, Listener and Caller (a client-server model).

Listener - The Listener unit is configured with a pipeline that always waits/ listens for a connection from an external Caller unit. After the connection is established, if the Listener is output, it will start sending the streaming data. If the Listener is input, it starts receiving the streaming data.

Caller - The Caller unit is configured with a pipeline that first seeks a connection with an external Listener unit, and when that is achieved the Caller receives streaming data from the Listener. The Caller pipeline is configured with the remote Listener unit's IP address and port.

This method works as long as each stream has one Listener and one Caller that use matching IP and port numbers, regardless of which unit is actually sending or receiving data. BRIDGE LIVE IP can even act as the Listener for one pipeline, and simultaneously act as the Caller for a different pipeline.

NOTE: SRT is a one-to-one connection scheme and cannot be used in a one-to-many workflow. If multiple SRT destinations are needed, simply add additional output streams following the above procedure. Each output stream will need its own unique port number.

This example procedure demonstrates methods for sending the identical or related SRT streams to multiple clients using a single pipeline.

Configuring Output Side of SRT Transmission

1. After selecting SRT as the type of output stream, the following default screen will be shown.

Figure 105. SRT Output Default Settings

For the SRT mode (under Configure Destinations), select either **Listener** or **Caller**. Choose the mode opposite to that configured for the other end of the stream.

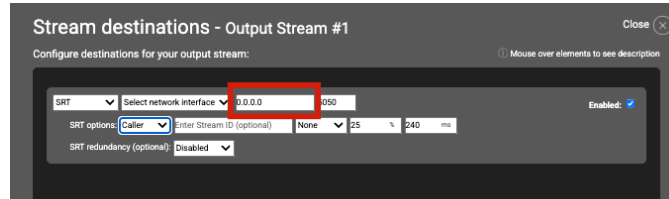
DNS Resolution of Hostname for SRT Caller Output

1. When using SRT output with Caller mode, you can use either an IP address or a web URL name. This can be useful when a URL points to multiple IP addresses for distribution.

2. Click on Configure Destinations under Stream Destinations to launch the destination configuration dialog.

NOTE: *Hover mouse over various fields for descriptions.*

Figure 106. SRT Caller Mode



3. Enter the IP Address to which you want to send the stream.
 - For Caller mode, enter the address of the remote listener which will be called to receive the stream.
 - For Listener mode, enter the local address which remote callers will use to request the stream be sent to them.

Port

Enter desired port number which when set with the IP must be a unique combination. It usually does not matter which port is used, it just needs to match on both ends.

NIC

Select the desired BRIDGE LIVE IP NIC.

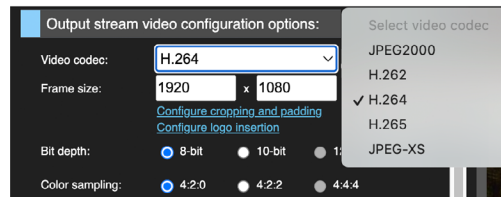
SRT Overhead

In addition, you should define the SRT overhead parameter – a percentage amount over Total Bit Rate that can be surpassed in order to achieve the lost data recovery. As a result, the maximum used connection bit rate is equal to the configured Total Bit Rate + SRT overhead. In general, this is the upper limit and the connection does not require it for normal operation.

Select Video Codec

1. Next, under the heading Output stream video configuration options, for Video codec, select the desired video codec: JPEG 2000, H.262, H.264, H.265, or JPEG-XS.

Figure 107. Multiple video codec selections available



2. The Frame size is auto-populated to reflect the detected input signal. The Scan rate and other properties are also auto-populated. Leave the remaining fields with their default values.

Figure 108. Output stream video configuration options

Output stream video configuration options:

Video codec: H.264

Frame size: 1920 x 1080

[Configure cropping and padding](#)
[Configure logo insertion](#)

Bit depth: ☒ 8-bit ☐ 10-bit ☐ 12-bit

Color sampling: ☒ 4:2:0 ☐ 4:2:2 ☐ 4:4:4

Video bitrate: 8 Mbit/s

Output scan rate: Same as input

Scan: ☒ progressive ☐ interlaced

Wrap captions: None

Output PID: Enter output PID

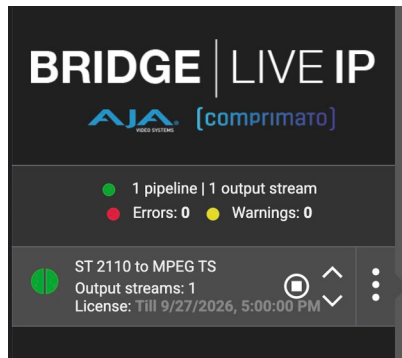
3. Click **Save & Restart**.

Figure 109. Save & Restart button



4. BRIDGE LIVE IP takes just a few moments to process the settings. Once finished, the left column updates to show your newly created pipeline. The two green circle halves indicate that both the input and output sides of the pipeline are running with no errors.

Figure 110. The newly created Pipeline displaying in the left column



One SRT Output Stream, Multiple Clients Example

If you have 8 remote clients who all want to view the same SRT stream, you can configure destinations to add 8 new destinations and increment the IP, port number or a combination of both, as long as each is unique. In this example only the port numbers are incremented. For example, client 1 is assigned port 5051, client 2 is assigned port 5052, client 3 is assigned port 5053, and so on.

NOTE: Hover mouse over various fields for descriptions.

1. To add a new destination with a unique Port number, click on **Configure Destinations** under **Stream Destinations** to launch the destination configuration dialog.

Figure 111. Adding port numbers

Stream destinations - Output Stream #1

Configure destinations for your output stream: Mouse over elements to see description

Icon	Protocol	Interface	IP Address	Port	Enabled
✖	SRT	Ethernet card 1 (eno1np0, 10.3.60.25)	10.3.60.25	5051	Enabled: ✔
SRT options: Listener None 25 240 ms					
✖	SRT	Ethernet card 2 (eno2np0, 10.6.152.2)	10.6.152.2	5052	Enabled: ✔
SRT options: Listener None 25 240 ms					
✖	SRT	Loopback (lo) connected	127.0.0.1	5053	Enabled: ✔
SRT options: Listener None 25 240 ms					

+ Add new destination

✔ Save changes

2. Click **Add new destination**. A new row is added for the new stream destination.
3. Edit the port number to match your port configuration plan.
4. Repeat as needed, then click **Save changes**. The new stream destinations are added to the pipeline. This is an efficient approach since it requires only one output stream and BRIDGE LIVE IP does not need to do any extra encoding.

Two SRT Output Streams, Multiple Clients Example

If you have 10 remote clients who all want to view the same SRT stream, but 5 of them require 15Mbps and the other 5 require 8Mbps, you would need to create two separate output streams—one for 15Mbps and another for 8Mbps.

For each output stream, configure five destinations, each with a unique IP and port number combination, to correspond to the 5 remote receiving clients.

NOTE: Encoding two output streams rather than one is more demanding on the BRIDGE LIVE IP system. However, it meets the needs of the two sets of remote clients with varying bit rate requirements.

Managing Pipelines

When to Reduce the CPU/GPU Load

Users are advised to look out for errors, alarms, dropped frames, etc. If the BRIDGE LIVE IP is consistently dropping frames, check CPU/GPU resources are utilization rates. For reliability AJA recommends that CPU, NVEnc, and NVDec utilization do not exceed 75%. GPU utilization can go up to 100%.

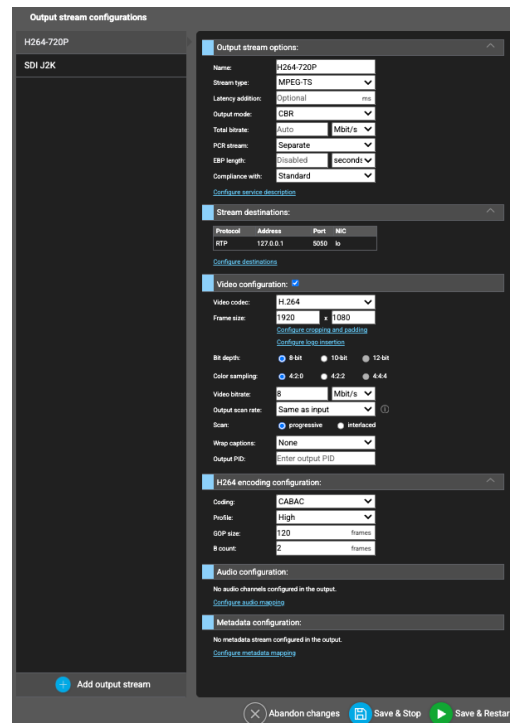
If reliability issues are discovered, consider reducing the CPU/GPU load by reducing channel count, number of outputs, 4:2:2 10-bit to 4:2:0 8-bit encoding, lowering the frame rate, etc.

Clearly Naming Multiple Output Streams

When adding an output stream, it is important to name it clearly to eliminate any potential confusion as to what it is. [Figure 112](#) shows the configuration panels for output stream settings and shows a situation where there are multiple output streams already configured.

Besides the mandatory options to direct the output to a specific network interface and a receiving device, these settings have more attributes that impact the quality of the resulting stream.

Figure 112. Additional Output Stream Configuration

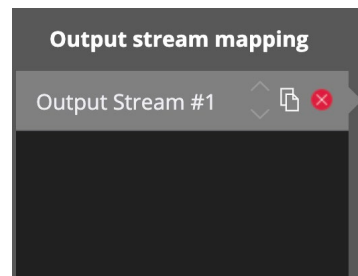


Cloning an Output Stream

If you need multiple similar output streams within one pipeline, you can clone an output stream that you have created earlier.

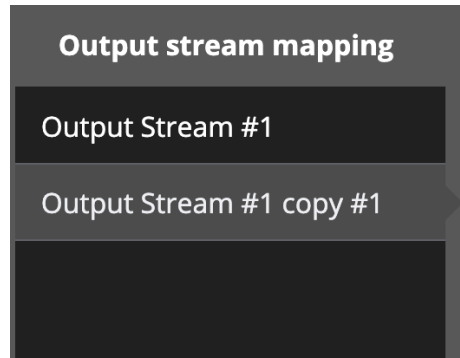
1. Hover your mouse over the output stream that you want to clone. A clone button displays.

Figure 113. Hovering mouse over output stream shows cloning button



2. Click the clone button. A copy of the output stream displays beneath the original.
3. Make any modifications you need to the copy of the original output stream.

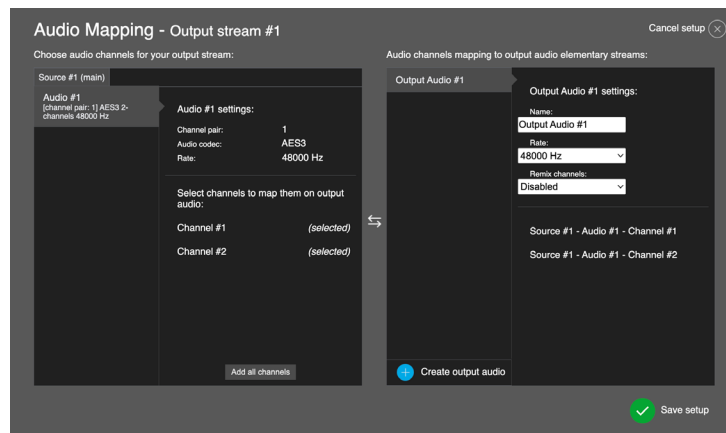
Figure 114. The cloned output stream (copy #1)



Output Stream Audio Configuration Options

While configuring the output stream, you can choose which transmitted audio channels you wish to include (Figure 115).

Figure 115. Audio Mapping



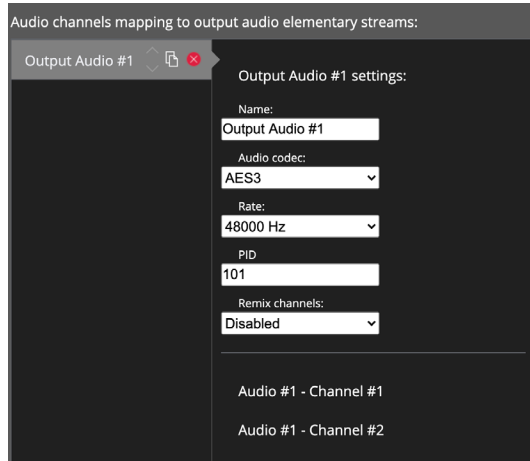
Cloning Output Audio Streams

If you need multiple similar output audio streams within one Audio Mapping, you can clone an output audio stream that you have created earlier.

To Clone an Output Audio Stream

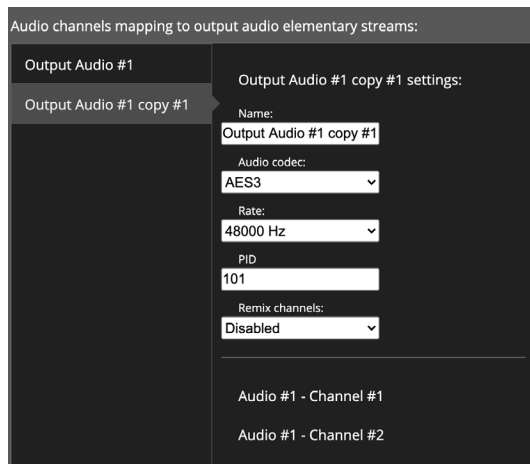
1. Hover your mouse over the output audio stream that you want to clone. A clone button displays.

Figure 116. Hovering mouse over output audio stream shows cloning button



2. Click the clone button. A copy of the output audio stream displays beneath the original.

Figure 117. The cloned output audio stream (copy #1)



3. Make any modifications you need to the copy of the original output audio stream.

Creating and Loading Preset Stream Configurations

In order to avoid manually configuring Pipelines, you can save configuration settings to a file. You can then load the saved configuration settings from the file and instantly populate all the settings, saving time and potential configuration errors.

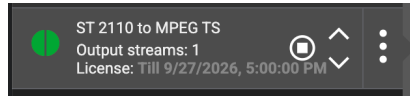
Presets can also serve as a way to backup, clone or restore pipeline configuration settings.

These configuration files are stored in the .json structured file format.

To save as a preset

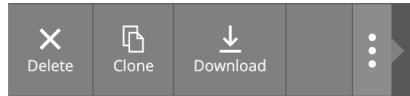
1. From the left column of Dashboard, click on the configured stream that you want to save as a preset. The window opens showing the Input stream configuration options and the Output stream mapping.
2. With the stream selected, or while hovering the mouse over the stream, a vertical ellipsis displays along the right edge.

Figure 118. Initial display of vertical ellipsis



3. Click on the vertical ellipsis. Three buttons display, giving you the choice to Delete, Clone, or Download the Pipeline.

Figure 119. Delete, Clone, and Download buttons

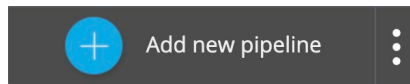


4. Select **Download**. A JSON file downloads to your computer that contains all of the configuration settings. If your pipeline is named "ST 2110 to MPEG TS" the downloaded file will be named "ST 2110 to MPEG TS.json." This is the Preset file. You can view or edit it using a text editor.

To load a preset configuration

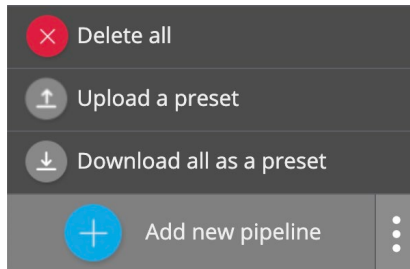
1. From Dashboard, hover your mouse over **Add new pipeline** from the lower left area.

Figure 120. Add new pipeline



2. Click on the vertical ellipsis. Choose from **Delete all**, **Upload a preset**, or **Download all as a preset**.

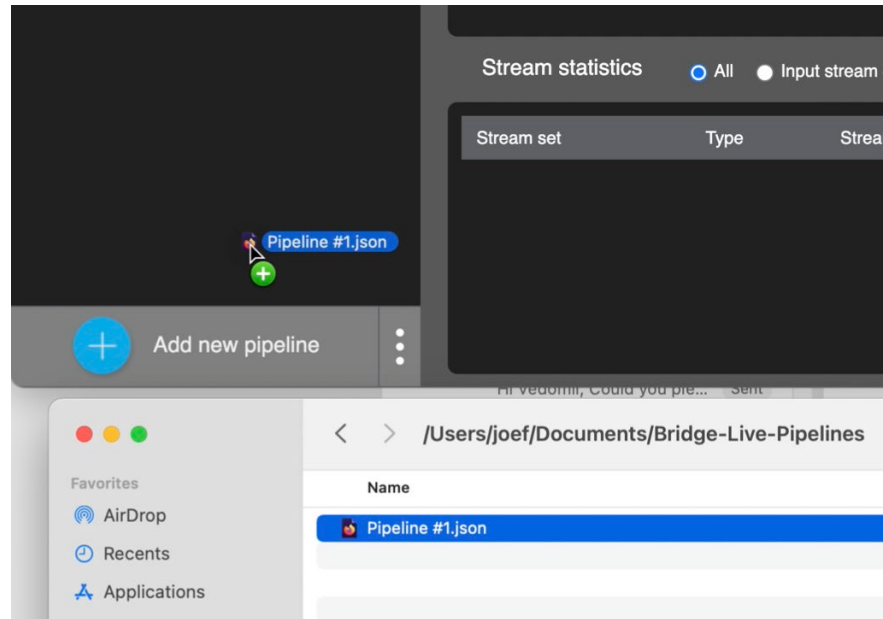
Figure 121. Three buttons displaying after clicking the vertical ellipsis



3. Select **Upload a preset**. A navigation window displays.
4. Navigate to the .json file that you want to upload, select it, then click **Open**. Dashboard refreshes to display the pipeline populated with all the configuration settings that were stored in the JSON preset configuration file.

Alternatively, if you have previously created a pipeline and saved it, you can drag and drop its .json file onto the left column as another method of adding a pipeline.

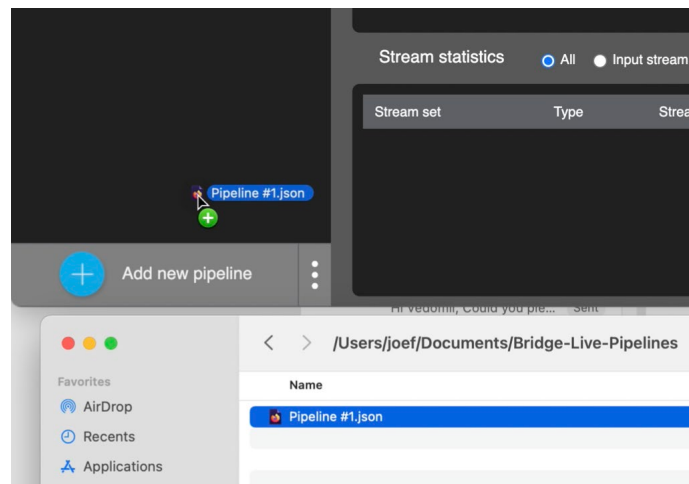
Figure 122. Adding New Pipeline by Dragging a .json File



JSON Created Pipelines

If you have previously created a pipeline and downloaded it, you can drag and drop its .json file onto the left column as another method of adding a pipeline. This new pipeline will have the previously selected parameters, but can be a good starting point for creating a new variation of that pipeline.

Figure 123. Adding pipeline with a .json file



When a .json file is loaded, the pipeline will have the original name of the downloaded pipeline. If you modify the settings to create a pipeline with different functionality, you should rename it.

Additional BRIDGE LIVE IP Features

Frame Rate Conversion

BRIDGE LIVE IP can either keep original frame rates or convert frame rates as required.

Supported Frame Rate Conversions

BRIDGE LIVE IP supports frame rate 50% down-conversion capabilities, for example:

- 60p to 30p
- 59.94 to 29.97
- 50p to 25p

BRIDGE LIVE IP also supports frame rate 50% up-conversion, such as:

- 50i to 50p

Frame Rate Conversions Not Supported

BRIDGE LIVE IP does NOT currently support these frame rate conversions:

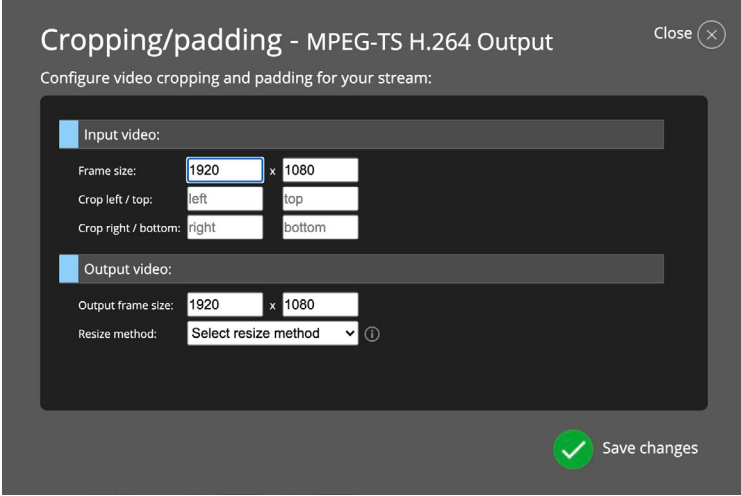
- 25 to 30
- 50 to 60
- 23.98 to 24.00
- 59.94 to 60p

NOTE: You can choose from only two different frame rate (fps) options on the output - either (i) same as the source, or (ii) halved in rate.

Output Stream Cropping and Padding

In order to address how you want BRIDGE LIVE IP to handle resolution changes, use the Cropping/Padding configuration window to adjust settings for the input video and output video. Click **Configure cropping and padding** in the Output stream video configuration options area to access the configuration window.

Figure 124. The Cropping/Padding configuration window



The screenshot shows a configuration window titled "Cropping/padding - MPEG-TS H.264 Output" with a "Close" button in the top right. Below the title is the instruction "Configure video cropping and padding for your stream:". The window is divided into two main sections: "Input video:" and "Output video:". The "Input video:" section contains three rows of controls: "Frame size:" with input fields for "1920" and "1080", "Crop left / top:" with dropdowns for "left" and "top", and "Crop right / bottom:" with dropdowns for "right" and "bottom". The "Output video:" section contains two rows: "Output frame size:" with input fields for "1920" and "1080", and "Resize method:" with a dropdown menu showing "Select resize method" and an information icon. At the bottom right of the window is a green checkmark icon followed by the text "Save changes".

For the input video, you can adjust frame size, left/top cropping and right/bottom cropping.

Cropping Example

As an example, let's consider a case in which you want to crop an image with a frame size of 1920 x 1080. You want to crop 30 pixels off of the left side, 30 pixels off of the right side, 20 pixels off of the top, and 20 pixels off of the bottom. In that case, you would enter the numbers as shown below. Select Scale for Resize method.

Figure 125. Example of entering numbers into Crop number fields

The screenshot shows a configuration window titled "Cropping/padding - MPEG-TS H.264 Output" with a "Close" button in the top right. Below the title is the instruction "Configure video cropping and padding for your stream:". The window is divided into two sections: "Input video:" and "Output video:". Under "Input video:", there are four input fields: "Frame size:" (1920 x 1080), "Crop left / top:" (30, 20), and "Crop right / bottom:" (1890, 1060). Under "Output video:", there are two input fields: "Output frame size:" (1920 x 1080) and "Resize method:" (Scale). A green checkmark icon and the text "Save changes" are located at the bottom right of the window.

- In the above example, the number "30" is being used to crop the left side. "30" indicates the horizontal offset of the first pixel to be used from the input video (0 by default). Use a negative value to create explicit padding.
- The number "20" is being used to crop the top. "20" indicates the vertical offset of the first pixel to be used from the input video (0 by default). Use a negative value to create explicit padding.
- The number "1890" is being used to crop the right side. "1890" indicates the horizontal offset after the last pixel to be used from the input video (frame width by default). Use a value greater than the width to create explicit padding.
- The number "1060" is being used to crop the bottom. "1060" indicates the vertical offset after the last pixel to be used from the input video (frame height by default). Use a value greater than the height to create explicit padding.

For the output video, you can adjust the output frame size and resize method.

Resize Method

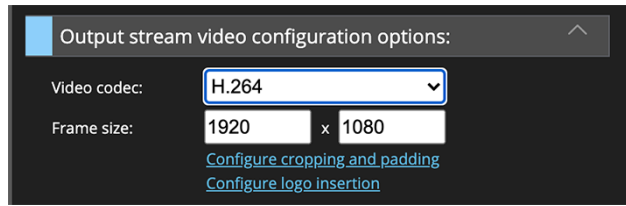
From the Resize method pull-down menu, available selections are:

- Scale: Resizes the configured input frame to the configured output frame and changes the aspect ratio when it differs.
- Crop: Resizes the configured input frame to the configured output frame, but keeps the input frame aspect ratio. The input will be automatically cropped horizontally or vertically.
- Pad: Resizes the configured input frame to the configured output frame, but keeps the input frame aspect ratio. The input will be automatically expanded with horizontal or vertical black bars.

Logo Insertion

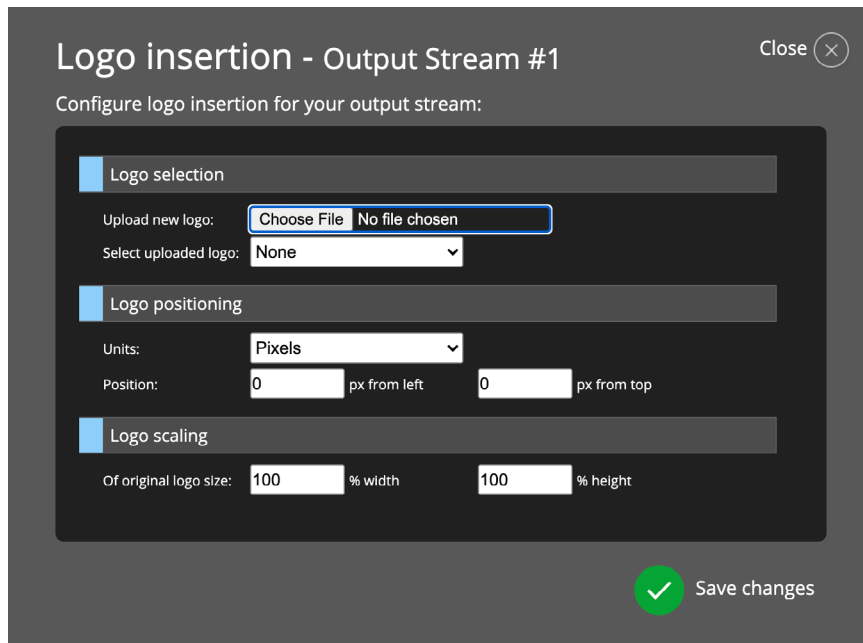
You can insert a logo into the stream. You can configure it in the "Output stream video configuration options" section by clicking the "Output stream video configuration options" button.

Figure 126. Logo Insertion Button



Select the 'Configure logo insertion' link to bring up the Logo Insertion window.

Figure 127. Logo Insertion Configuration



First, a logo file in the .png format must be uploaded and selected. After that, the user can choose to position the logo either in pixels, or set its positions using percent. If for some reason a logo has to have adjusted scale, it's possible to do it using the Logo scaling option.

If you save a pipeline that uses the Logo insertion function and has some logo uploaded as a preset, it will be saved with the logo file, too.

Verifying Pipeline Configurations

You can use a variety of methods to verify your pipeline configurations.

For an encoded stream using stream type MPEG-TS, you can use RTP, UDP, or SRT to send the stream to an output stream destination device.

For RTP or UDP, BRIDGE LIVE IP needs to be able to send the stream directly to the target location. If the target location is behind a router that blocks it, or if the target location is in a network behind NAT (network address translation), your target location will not be able to receive the stream.

For an encoded stream using stream type RTMP(S), the stream cannot do point-to-point. It has to bounce off of a server first.

See "[Alternative Methods for Verifying Pipeline Configuration](#)" on page 98 for more advanced methods of testing pipelines.

Verifying the Configuration of Your Pipeline Remotely

When an SRT output pipeline is configured on BRIDGE LIVE IP, you can verify it is functioning correctly by accessing the stream with off-the-shelf software for monitoring.

Besides the BRIDGE LIVE IP itself, a few examples are:

- VLC - (see <https://www.videolan.org>)
- OBS - (see <https://obsproject.com>)

Verifying BRIDGE LIVE IP Output Stream

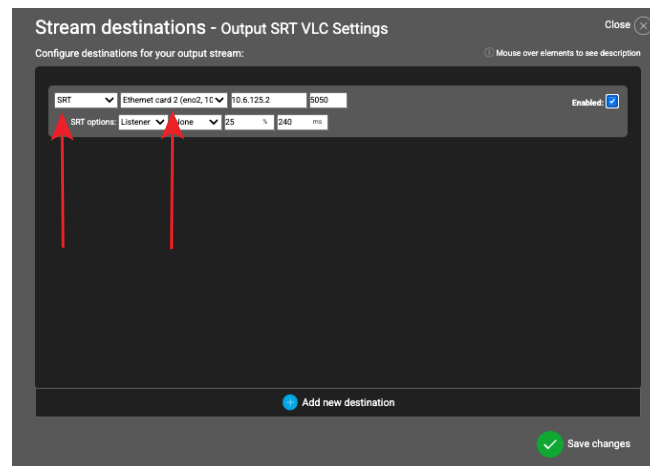
In this example we will use VLC media player to monitor a BRIDGE LIVE IP output stream.

BRIDGE LIVE IP Configuration for Sending an SRT Stream

1. Under Output Stream Configuration, click on Configure Destinations in the Stream Destinations pane to launch the destination configuration dialog. In the dialog, select SRT from the Type drop-down menu.

NOTE: Hover mouse over various fields for descriptions.

2. For the IP address field, enter the IP address for the computer you will use to run VLC media player.
3. The default 5050 port number can be used, provided it is not used by another BRIDGE LIVE IP output stream.
4. Select the desired Ethernet card from the NIC drop-down menu.



5. Note what the SRT mode is. VLC will need to be configured with the opposite SRT mode.
6. Save the changes.
7. From the lower right corner of Dashboard, click **Save and Start**. BRIDGE LIVE IP applies your configuration changes.

VLC Media Player Configuration for Receiving an SRT Stream

You now configure VLC to receive the SRT stream you just configured on BRIDGE LIVE IP.

NOTE: This is not intended to be a comprehensive instruction set and may differ from later releases of VLC. Please follow VLC documentation for complete instructions.

1. From VLC media player, go the Network configuration window.

2. In the URL field, enter **srt://<IP Address>:<Port Number>**. For example, a VLC URL could look like:
`srt://198.169.208.120:5050`
3. Configure the SRT mode to be either **Caller** or **Listener**, whichever is opposite the BRIDGE LIVE IP's configuration.
4. Click **Open**. VLC will open a new window displaying the live stream of the source that you selected in your new BRIDGE LIVE IP pipeline. VLC may take a brief moment to open the new window.

Verifying BRIDGE LIVE IP Input Stream

Generating an External SRT Output Stream for Input Testing

Besides the BRIDGE LIVE IP itself, the following are examples of external devices or applications that can be used to generate an SRT stream for testing purposes:

- HELO Plus - (see <https://www.aja.com/products/helo-plus>)
- VLC - (see <https://www.videolan.org>)
- OBS - (see <https://obsproject.com>)

Chapter 4 – Reference

Multiple Input Sources

Tabs at the top of the pane allow selection of additional audio or metadata sources. The **Source #1 (main)** tab is dedicated to the main video source, and is automatically assigned for that purpose on all pipelines.

Clicking on the Blue plus symbol adds another Input source tab, and displays information for that source.

Up to two more input sources can be added, to provide the capability to merge separate video, audio, and metadata into a single output. Using another IP input for audio or metadata is considered utilization of the IP port, and it will not be available to be used in another pipeline.

Auto Reconfiguration

Enabling this feature will automatically recognize the incoming video and audio formats and pass it through to the output. The output setting will then determine if the formats will follow the incoming format change or follow the output setting rules. If the incoming signal changes, such as a switch from a 1080p59.94 signal to a 720p59.94, the input change will be detected and passed to the output.

When an input format change is autodetected, the audio should be verified, to ensure it is as desired. If the Audio format changes (eg: from AES3 to AAC), the Audio output settings will need to be adjusted.

Encoding Incoming Uncompressed IP to Various Stream Types

BRIDGE LIVE IP provides four channels of UHD, or 16 channels of HD for IP input or output.

When it comes to deriving streams from incoming uncompressed IP sources, each IP input can be output to multiple formats and/or destinations using H.264 (AVC), H.265 (HEVC), MPEG2, NDI, and optionally JPEG 2000 (TR-01) and JPEG XS (TR-07).

Regarding Containers and Protocols, BRIDGE LIVE IP supports HLS, SRT (encryption options: AES-128, AES-192, or AES-256), RTMP, RTMP(S), RTP, UDP, and MPEG-TS.

Output Stream Options

Supported Output Data for Single Program Transport Stream

BRIDGE LIVE IP supports the following types of output data in a single program transport stream:

- Video
 - H.262 – 4:2:0, 8bit, up to 1920x1080p60
 - H.264 CPU – 4:2:2/4:2:0, 8bit/10bit, baseline/main/high profile, up to 3840x2160p60
 - H.264 GPU – 4:2:0, 8bit, main/high profile, up to 3840x2160p60
 - H.265 GPU – 4:2:0, 8/10bit, main/main10 profile, up to 3840x2160p60

- JPEG 2000 GPU – 4:2:2, 10bit/12bit, up to 3840x2160p60
 - Encapsulation – standard TR-01 only
- JPEG XS CPU – 4:2:2, 10bit, up to 3840x2160p60
 - Encapsulation – standard TR-07 only
- IP Uncompressed – 4:2:2, 10bit, up to 3840x2160p60
- MPEG-2
- NDI
- HLS
- Audio
 - AAC-LC (ADTS, LATM)
 - AAC-HE (ADTS, LATM)
 - AAC-HE v1&v2 (ADTS, LATM)
 - AC3 up to 6 channels
 - AES3
 - MPEG 2
 - NDI
 - Uncompressed PCM
- Closed Captions – H264 insertion
- Metadata – LTC insertion, SCTE 104 to SCTE 35 conversion

Stream Type

NDI

ST 2110 Inputs can be encoded to NDI for output to the network.

NDI Inputs can be received, decoded and output as ST 2110 .

NDI 8 and 10 bit is supported with HDR manual marking on NDI output.

HLS (Input)

HLS sources can be input to BRIDGE LIVE IP, and then decoded to ST 2110 for output.

HLS Input supports AVC TS segments and fragmented MP4.

BRIDGE LIVE IP supports HLS inputs with up to UltraHD resolution.

HLS (Output)

HLS Output supports AVC TS segments.

BRIDGE LIVE IP supports HLS outputs with up to HD resolution

ST 2110 sources can be encoded for sharing via HLS.

MPEG-TS

BRIDGE LIVE IP supports data transmission using MPEG-TS (MPEG Transport Stream) container format. The transport stream is used in broadcast systems and is designed to be used in terrestrial or satellite broadcast, for example. It can carry multiple programs. Each program contains packets of video stream, audio stream and metadata (if present).

BRIDGE LIVE IP supports receiving and processing the MPEG-TS streams, detects all programs, and allows its users to choose them easily.

RTMP (Input and Output)

BRIDGE LIVE IP supports three methods for RTMP stream key configuration.

Custom - The RTMP sender does not have a stream key or does not have an IP/stream key. You type in a custom (abc123) stream key. If the sender has an IP and just needs the key, copy/paste the key into the sender. If the sender does not have an IP or key, copy and paste the desired NICs IP/key combination into the RTMP sender.

Random Key Generation- The RTMP sender does not have a stream key or does not have an IP/stream key. Select 'generate random'. If the sender has an IP and just needs the key, copy/paste the key into the sender. If the sender does not have an IP or key, copy and paste the desired NICs IP/key combination into the RTMP sender.

Sender has IP/Key -Type or paste in the IP/Key combo into the 'RTMP Stream Key' window.

RTMP(S) (Output)

RTMP in BRIDGE LIVE IP supports streams both with and without authentication. The protocol is used for secure video, audio and data streaming over the Internet.

BRIDGE LIVE IP supports RTMP in the H.264 video codec and the AAC audio codec. Some services, such as YouTube, do not accept RTMP streams without audio.

To set up an RTMP output stream, select Output stream options, Stream type as RTMP and just beneath it, fill out the URL address. An example URL of a stream with authentication is the following:

```
rtmp://user:pass@IPADDRESS/application/stream-key
```

If you have provided a valid URL, BRIDGE LIVE IP will produce an output stream upon starting the configured pipeline using RTMP.

You can see how the UI looks without a configured URL address in [Figure 128](#).

Figure 128. Configuring RTMP

The screenshot shows a configuration window with a dark background. It has two main sections: 'Output stream options:' and 'Output stream destination:'. In the 'Output stream options:' section, the 'Name:' field contains 'RTMP Output' and the 'Stream type:' dropdown is set to 'RTMP(S)'. In the 'Output stream destination:' section, the 'URL address with stream key:' field contains a placeholder text: 'Enter URL address with stream key' followed by an example: 'rtmp[s]://[user:password@example.com:1935/live/stream-key]'. Below this field is a blue link that says 'Configure destinations'.

Total Bit Rate

Total Bit Rate and Data Quality

The overall amount of data that is transmitted is controlled by the total allowed bit rate. This attribute combines the sum of video, audio and remaining bit rates.

Distinction between Total Bit Rate and Video Bit Rate

Total bit rate is the whole bit rate of the transport stream. Total bit rate contains video, audio and metadata, plus possible padding.

Video bit rate, on the other hand, is the bit rate of the video only. This attribute has a direct impact on the resulting quality – the lower the allowed video bit rate, the less the quality of transmitted data.

You can limit the total video bit rate which will define which part of the total bit rate is dedicated to video data. In some scenarios, it may be necessary to adjust the total bit rate overhead over the video bit rate.

PCR Stream

Some receivers require PCR to be stand-alone and not to be in the video stream. This control allows you to select whether the PCR stream should be included in the video stream or be a stand-alone stream included in the total bit rate, under its own PID.

EBP Length (Encoder Boundary Point)

Use the EBP setting to define the parameter for Encoder Boundary Point insertion, which is often used in ABR streaming. This field is typically left empty.

Compliance With

This refers to the transport stream encapsulation standards, and it is relevant to all stream types. If you are using an Evertz device, select the Evertz standard. Otherwise, select Standard.

Configure Service Description

To access this functionality, you need to be subscribed to a service.

This is for timing and synchronization for specific end point services for streaming. Certain service providers may have some specialized version of streaming that would require this level of setup, but this is not frequently used.

Output Stream Destinations

Configure Destinations

You can have multiple output stream destinations for each pipeline.

Type

- RTP
- UDP
- SRT

One Output Stream, Multiple Port Numbers

If you have 10 remote clients who all want to view the same SRT stream, you can Configure destinations to add 10 new destinations, incrementing the port number for each additional remote client; for example, client 1 is assigned port 5051, client 2 is assigned port 5052, client 3 is assigned port 5053, and so on.

1. To add a new destination with a new Port number, click on Configure Destinations under Stream Destinations to launch the destination configuration dialog.

NOTE: Hover mouse over various fields for descriptions.

Figure 129. Adding port numbers

Stream destinations - Output Stream #1

Configure destinations for your output stream: Mouse over elements to see description

Protocol	Interface	IP Address	Port	Enabled
SRT	Ethernet card 1 (eno1np0, 10.3.60.25)	10.3.60.25	5051	Enabled: ☒
SRT options: Listener None 25% 240 ms				
SRT	Ethernet card 2 (eno2np0, 10.6.152.2)	10.6.152.2	5052	Enabled: ☒
SRT options: Listener None 25% 240 ms				
SRT	Loopback (lo) connected	127.0.0.1	5053	Enabled: ☒
SRT options: Listener None 25% 240 ms				

+ Add new destination

☒ Save changes

2. Click **Add new destination**. A new row is added for the new stream destination.

3. Edit the port number to match your port configuration plan.

Repeat as needed, then click **Save changes**. The new stream destinations are added to the pipeline.

This is an efficient approach since it requires only one output stream and BRIDGE LIVE IP does not need to do any extra encoding.

Two Output Streams, Multiple Port Numbers

If you have 10 remote clients who all want to view the same SRT stream, but 5 of them require 15Mbps and the other 5 require 8Mbps, you would need to create two separate output streams—one for 15Mbps and another for 8Mbps.

For each output stream, configure five destinations, each with a unique port number, to correspond to the 5 remote receiving clients.

Encoding two output streams rather than one is more demanding on the BRIDGE LIVE IP system. However, it meets the needs of the two sets of remote clients with varying bit rate requirements.

NIC

Network Interface Card (NIC) options typically include:

- Ethernet card 1: 10 GigE RJ-45
- Ethernet card 2: 10 GigE RJ-45
- Ethernet card 3: 10/25 GigE Primary SFP28
- Ethernet card 4: 10/25 GigE Secondary SFP28
- Loopback (lo)

This list of selections can vary based on the configuration done during UI Setup. Users might be able to select only one Ethernet card and Loopback based on how BRIDGE LIVE IP is configured.

Output Stream Video Configuration Options

Video Codec

When selecting which codec to use, one aspect to consider is the type of equipment being used by the receivers. If their equipment does not support the higher demands of the codec, that could present challenges, especially if the receivers would be required to purchase new equipment in order to be able to receive the signal.

Choose from settings for the chosen video codec that define quality vs. speed difference.

NDI

NDI is a flexible and versatile solution, allowing multiple video streams on a shared connection. NDI supports high quality, low latency, frame-accurate video over standard Ethernet networks. NDI stands for Network Device Interface and is developed by NewTek.

NOTE: NDI is a paid for feature which must be purchased and have the license activated on the BRIDGE LIVE server. One BLVE-NDI license activates all NDI access on the server. The license is non-transferable.

HLS

BRIDGE LIVE IP supports output stream type HLS (HTTP Live Streaming), an adaptive bit rate streaming protocol. HLS utilizes H.264 to support both AVC TS and Fragmented MP4. HLS supports audio formats EAC3, AC3 and AAC.

IP video stream sources can be input to BRIDGE LIVE IP, and then encoded for output via HLS.

Based on TCP, HLS is used to deliver content to end point devices such as phones and tablets or applications such as web browsers. For browsers all that is needed is the URL with the playlist extension. Safari has this support natively; Chrome and Firefox have extensions available for HLS playback.

NOTE: HLS is not useful for contribution, backhaul or any other workflow that requires low latency.

The best way to deliver HLS with BRIDGE LIVE IP is to provide the pre-packed video to a CDN. This means many end-point-devices can utilize the content simultaneously.

JPEG 2000

JPEG 2000 is an image coding system that uses state-of-the-art compression techniques based on wavelet technology and offers an extremely high level of scalability and accessibility. Content can be coded once at any quality, up to lossless, but accessed and decoded at a potentially very large number of other qualities and resolutions and/or by region of interest, with no significant penalty in coding efficiency.

Two methods used to transport JPEG 2000 are VSF TR-01:2103 and VSF TR-01:2018.

JPEG XS

BRIDGE LIVE IP JPEG XS input supports H.264 4:2:2 10-bit. JPEG XS (VSF TR-07) is a paid for feature which must be purchased and have the licenses activated on the BRIDGE LIVE IP server. Each BLVE-JXS01 license is for one HD channel (encode or decode). Each BLVE-JXS04 license is for one UHD channel or 4 HD channels (encode or decode). The license is non-transferable. JPEG XS is supported in MPEG-TS streams via UDP, RTP and SRT.

JPEG XS Configuration, Input Stream

Input stream autodetection and configuration is now supported for all MPEG-TS input streams as defined in ["Configure Input Stream Options" on page 55](#).

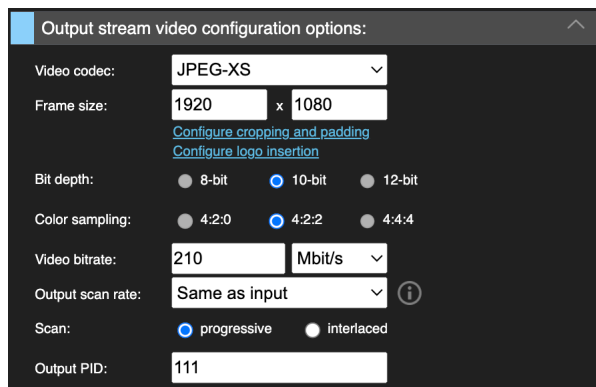
If you want to set it up manually, follow these procedures.

1. Select the appropriate MPEG-TS option:
 - MPEG-TS over UDP or RTP
 - MPEG-TS over SRT
2. Check 'Input Stream Video Configuration Options'.
 - A. If the incoming source has been detected via port #, this section should be filled with detected frame and scan rate.
 - B. If it's necessary to manually configure the Input stream, open the 'Video Codec' dropdown and select 'JPEG XS'.
 - C. Select the correct frame size and scan rate.
 - D. The Bit depth and Color sampling will default to 10-bit and 4:2:2.

JPEG XS Configuration, Output Stream

3. JPEG XS output will only be supported via MPEG-TS Stream type. In 'Output Stream Options', select 'MPEG-TS'. In 'Output Stream Video Configuration Options' Select 'video codec' dropdown and select 'JPEG XS'.
 - A. Select the correct frame size and scan rate.
 - B. The Bit depth will default to 10-bit and will not be selectable. The Color sampling will default to 4:2:2 and will not be selectable.
 - C. Select the desired Video bit rate.
 - D. Configure the 'Scan rate', 'Field Order', and 'Output PID', as necessary.

Figure 130.



H.262 Encoding Options

H.262 is the official name for MPEG-2. Since it is the oldest of the codecs and it has been around for a long time, many people are familiar with it and know how to work with it. It is known to be reliable.

- Profile: High, Main, Simple
 - The Simple profile allows you to use only I and P frames, while Main or High profiles support even B frames. All H.262 profiles are 4:2:0. The High profile also supports Spatial and SNR scalability modes. For bit rates and profiles, you may decide to use an older profile because of compatibility with older devices (especially older phones)
- GOP size – distance between two I-frames
- B count – number of B-frames between two P-frames

H264 Encoding Options

H.264 is newer than H.262, and it has better image quality and is more efficient.

- Coding – CABAC, CAVLC
 - CAVLC is typically used for compatibility with old devices. CAVLC is an older coding option and is easier to decode. However, for the same bit rate, it produces lower video quality
 - CABAC is a newer coding option and is a bit harder to decode. It provides the same quality of video as CAVLC while using a lower bit rate
- Profile – Baseline, Main, High
 - Similar to H.262 profiles, the higher the profile, the more capabilities it has. The Main profile and higher allows B frames and CABAC. The High profile supports 4:2:2 sampling and 10-bit depth
- Refresh Mode
 - IDR
 - Every GOP starts with an IDR I-frame containing the whole picture.
 - GOP size – the distance between two I-frames
 - B count – number of B-frames between two P-frames
 - GDR (intra-refresh)
 - At the start of each Refresh Period, the encoder inserts Refresh Count P-frames, each refreshing a portion of the picture (one row in NVEnc, one column in the CPU encoder). The remainder of the period consists of regular P-frames. There are no I-frames or B-frames.
 - Use it to avoid bitrate spikes
 - Refresh Period – the distance (frames) between two intra refreshes
 - Refresh Count – number of frames used to refresh the whole picture. Must be equal to or less than Refresh Period. CPU encoder requires Refresh Count to equal Refresh Period.

H265 Encoding Options

H.265 supports UltraHD. It is newer and even more efficient than H.264. Its efficiency is in decoding. (Encoding requires more computing power up front.)

- Profile: Main, Main10
 - Main uses 8-bit encoding/decoding. Main 10 uses 10-bit encoding/decoding. On a system level, 10-bit I/O is more resource intensive
- GOP size – distance between two I-frames
- B count – number of B-frames between two P-frames

Video Bit Rate

Enter a bit rate to define how much of the total bit rate is dedicated to video data. You can specify the units in terms of Mbit/s, kbit/s or bit/s.

Wrap Captions

The H.264 video codec supports wrapping closed captions. These are available to be selected and wrapped to output in the video elementary stream only if they are detected in the source ST 2110 metadata stream as CEA 608 or CEA 708.

Output PID

In general, each elementary stream or table in MPEG-TS is identified by a packet Identifier. You can specify the PID for your output MPEG-TS. Otherwise it defaults to the source's PID.

Overwriting a PID

There may be situations in which you would want to overwrite the PID. When MPEG-TS is used for both the input and the output, BRIDGE LIVE IP offers the option to overwrite the value of the incoming PID by filling in a new value in the Output PID field.

In some broadcast environments, operators use fixed PIDs for specific types of elementary streams; for example, 100 for video, 200 for audio, 300 for captioning, etc.

If you need to filter a specific PID at the input, or if you need to set the PID manually at the output for another device that also uses a PID filter, the ability to overwrite the PID becomes useful.

If you leave the Output PID field empty, the output PID will be the same as the input PID. If you are not using MPEG-TS and leave the Output PID field empty, BRIDGE LIVE IP will generate a new output PID.

Decoding Incoming Streams and Outputting Uncompressed IP

Input Stream

Input streams can be one of the following:

- MPEG-TS over RTP, UDP, or SRT
- RTMP
- NDI
- HLS

Configuring Input Streams

MPEG-TS over RTP, UDP, or SRT Input Stream Sources

When configuring MPEG-TS input streams of type RTP, UDP, or SRT, you will need to configure network settings.

There are circumstances in which you will need to fill out the IP address and Port:

- When the input stream has a multicast address
- When the input stream is of type SRT and BRIDGE LIVE IP is set as the caller

Enter the IP address and port number that corresponds to where the input stream is being sent.

For example, when BRIDGE LIVE IP is using the IP address 172.23.26.29, it will receive a unicast transport stream at that IP address and port 5000. So the valid input combination in BRIDGE LIVE IP will be an IP address of 172.23.26.29 (or just 0.0.0.0) and port number 5000.

NOTE: *Entering the IP address of 0.0.0.0 for the input stream tells BRIDGE LIVE IP to use the IP address of its selected Ethernet port where the signal is being received.*

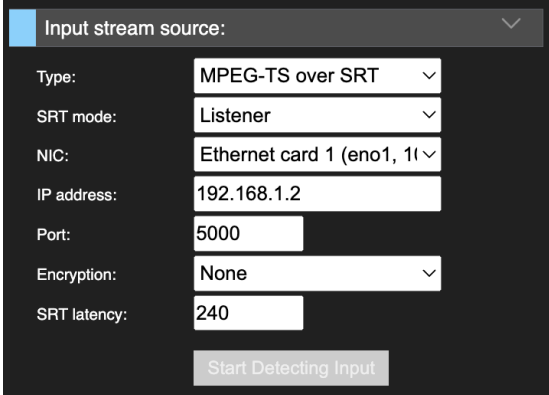
For SRT configuration, see ["SRT Protocol for Reliable Data Transmission" on page 92](#).

MPEG-TS and MPTS (Multiple Program Transport Streams) are found in Input Stream configuration. This means that if you have one transport stream being sent to one particular IP address and Port combination, it can contain various programs. With MPEG-TS and MPTS, you can differentiate whether it is just one program or if there are multiple programs. If it is MPTS, there are more video streams, and you choose between the program number that you want to decode and process. If it is single stream, then you work with only one.

Configuring Input Side of SRT Transmission

When you wish to configure SRT for use for MPTS (Multiple Program Transport Streams), select the Input Stream Type item called MPEG-TS over SRT. Before configuring the IP address and IP port, select whether you intend to use Caller/Listener mode. This directly impacts what IP you need to provide.

Figure 131. Configuring SRT Input Source

The image shows a configuration window titled "Input stream source:". It contains several fields: "Type:" with a dropdown menu set to "MPEG-TS over SRT"; "SRT mode:" with a dropdown menu set to "Listener"; "NIC:" with a dropdown menu set to "Ethernet card 1 (eno1, 11"; "IP address:" with a text field containing "192.168.1.2"; "Port:" with a text field containing "5000"; "Encryption:" with a dropdown menu set to "None"; and "SRT latency:" with a text field containing "240". At the bottom, there is a button labeled "Start Detecting Input".

When you select SRT mode:

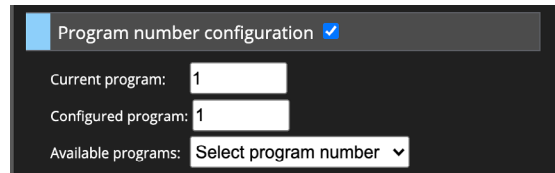
- Listener – IP address and Port of the same machine where the data is being received (listened to) from an external source
- Caller – IP address and Port of the remote machine from where the data will be sent

It is necessary to define the SRT latency variable in milliseconds (ms). The parameter is the time of intended delay of network packets (a buffer) that is allowed for the connection to slow down the data in transmission in order to provide a time slot to re-send lost UDP packets if they occur. This is what allows SRT protocol to establish a reliable connection with the focus on removing video disruptions.

Choosing the Program Number

When you wish to choose which program to use, you need to enable the Program number configuration in Input stream configuration options. Once allowed, you can select the program number from a drop-down menu. Current program informs about the current configuration, while Configured program has to be applied first in order to take effect. If you do not set up anything, the first program in the list is selected. If a Configured program number is not present in the stream, BRIDGE LIVE IP reports an error. Once you change the program number and apply the configuration, video with another PID is detected (if present).

Figure 132. Configuring MPTS



The screenshot shows a configuration window titled "Program number configuration" with a blue checkmark icon. It contains three input fields: "Current program:" with the value "1", "Configured program:" with the value "1", and "Available programs:" with a dropdown menu showing "Select program number".

Muxing

BRIDGE LIVE IP is capable of muxing multiple streams such as audio inputs, captions and metadata streams into a single output stream. The list of supported input data is as follows:

Video

- BRIDGE LIVE IP
 - Up to UHD P60 ST 2110
 - Uncompressed 4:2:2; 8bit/10bit
 - Up to 1080i60/720p30; 4:2:2; 8bit/10bit
- Generic single program MPEG transport stream
 - Encapsulation – standard TR-01, Evertz TR-01, MediaLinks TR-01, legacy NetInsight TR-01
 - High-bit rate JPEG 2000 – 4:2:2, 10bit/12bit, up to 3840x2160p60/i60
 - H.262 – 4:2:0, 8bit, up to 3840x2160p60/i60
 - H.264 – 4:2:2/4:2:0, 8bit/10bit, up to 3840x2160p60/i60
 - H.265 – 4:2:0, 8bit/10bit, up to 3840x2160p60
 - High-bit rate JPEG XS – 4:2:2, 10bit, up to 3840x2160p60/i60

Audio

- AES3 uncompressed (SMPTE 302M)
- ST-2110-30 uncompressed audio
- AAC (ADTS, LATM)
- AAC-HE (ADTS, LATM)
- AAC-HEv1 (ADTS, LATM)
- AAC-HEv2 (ADTS, LATM)
- DolbyE Passthrough
- AC3
- E-AC3

Closed Captions

- SMPTE 2038 (608/708)
- EIA-708 (ST 2110-40 Tx)
- S12M-2 V-TCODE (ST 2110-40 Tx)

Metadata

- LTC timestamps
- MPEG TS PCR
- Ad-markers – SCTE104
- Pass-through capabilities

Electronic Program Guide

The Electronic Program Guide (EPG) is metadata that provides program information to end users as a program guide, including channel listings and program schedules for upcoming, current, and past programs.

BRIDGE LIVE IP supports EPG passthrough for the European DVB standard only. The North American ATSC standard is not currently supported.

EPG Support Details

- Supported Standard - DVB EIT (Event Information Table) - European broadcasting standard.
- Transport Method - MPEG-TS passthrough on dedicated PID.
- Functionality - Passthrough only (BRIDGE LIVE IP does not generate or modify EPG data).

Configuration

EPG passthrough requires no additional configuration. Note the following:

- Input stream must be MPEG-TS containing DVB EIT metadata.
- Output stream must be configured as MPEG-TS.
- EIT metadata will pass through transparently.

Current Limitations

- ATSC EIT - North American standard not supported.
- EPG Generation - BRIDGE LIVE IP does not create EPG data.
- EPG Modification - BRIDGE LIVE IP does not edit existing EPG data.

Alternative Methods for Verifying Pipeline Configuration

Using RTMP Server for Mac

A free application, Local RTMP Server for macOS, is available through GitHub. You can use it to stream straight to a Mac host, reading it back with VLC and verifying it locally to make sure RTMP is working. The application can be found through the following link:

<https://github.com/sallar/mac-local-rtmp-server>

SRT Protocol for Reliable Data Transmission

SRT (Secure Reliable Transport) is a video transport protocol that is intended to be used over unreliable networks such as the public Internet. It amends packet loss, jitter, and fluctuating bandwidth issues to maintain the high quality of transported video streams. SRT has end-to-end security mechanisms to protect transmitted data as well and is easy to configure to work with network firewalls. If you want to learn more about the protocol, please visit the official SRT Alliance website at <https://srtalliance.org/>.

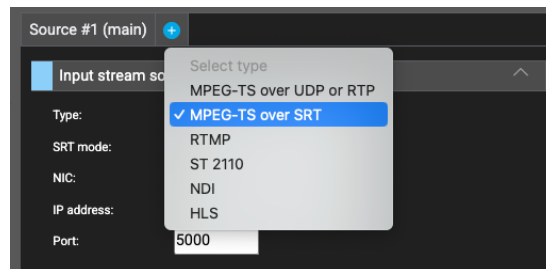
BRIDGE LIVE IP supports 2 SRT modes of operation – Listener and Caller. In other words, this is simply the client–server model. The Listener unit is configured to connect to its own local IP address that will be receiving data from the (external) Caller unit. The Caller machine is configured with the IP address of an external (to the Caller) unit where the data will be listened to.

NOTE: SRT is a connection-oriented communication and therefore cannot use multicast IP delivery.

Configuring SRT Input

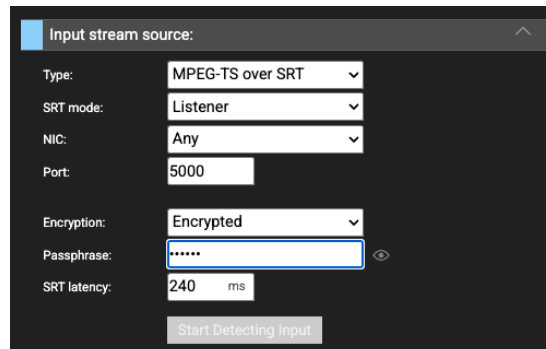
When configuring SRT for use, select the Input Stream type called MPEG-TS over SRT.

Figure 133. Selecting MPEG-TS over SRT



Before configuring the IP address and IP port, determine if Caller or Listener mode will be used. This has a direct impact on what IP needs to be provided.

Figure 134. Configuring an SRT Input Source



SRT Mode

Select the desired SRT Mode:

- Listener – Specify the port of the local machine where an external Caller unit will request a connection to start sending data there. If "Any" interface is selected, the SRT connection on the selected port is accepted on all interfaces, automatically supporting redundant sources
- SRT Bonding (see ["SRT Bonding \(Redundancy\)" on page 101](#)) – After selecting a specific interface, a local IP which is listened on, may be also specified.
- Caller – IP port of the remote machine from where the data will be sent

SRT Encryption

BRIDGE LIVE IP supports SRT Encryption. Encryption must be configured on both ends, Caller and Listener, and uses the same passphrase on both ends (symmetric cryptography). The passphrase must have between 10 and 79 characters. Clicking on the  icon reveals the passphrase.

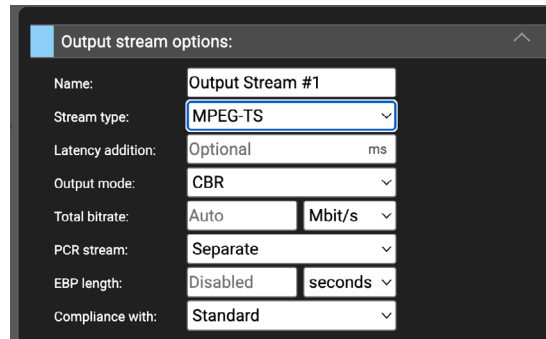
SRT Latency

It is necessary to define the SRT latency variable in milliseconds (ms). The parameter is the time of intended delay of network packets (a buffer) that is allowed for the connection to slow down the data in transmission in order to provide a time slot to re-send lost UDP packets if they occur. This is what allows the SRT protocol to establish a reliable connection with a focus on removing video disruptions.

Configuring SRT Output

When creating the pipeline's output side, traffic may be sent via SRT to make the connection more reliable and prevent image loss during transmission. In the Output stream options section, select MPEG-TS, which allow for selecting the desired protocol.

Figure 135. Selecting MPEG TS for SRT Output

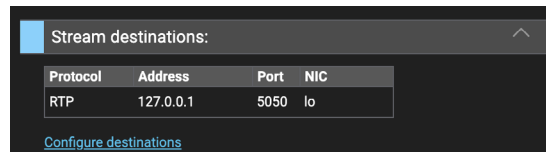


Output stream options:	
Name:	Output Stream #1
Stream type:	MPEG-TS
Latency addition:	Optional ms
Output mode:	CBR
Total bitrate:	Auto Mbit/s
PCR stream:	Separate
EBP length:	Disabled seconds
Compliance with:	Standard

NOTE: When configuring SRT for use, be sure to select the Input Stream type called MPEG-TS over SRT. See ["Selecting MPEG-TS over SRT" on page 99](#).

Next, go to Stream Destinations section and select 'Configure Destinations'.

Figure 136. Configure Destinations

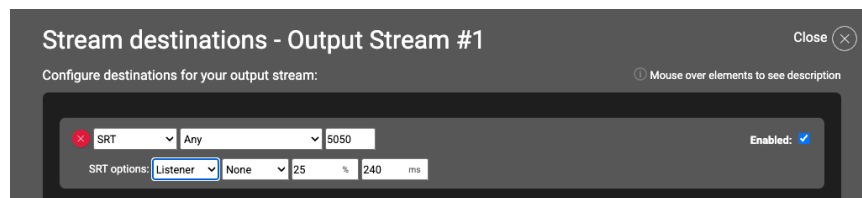


Protocol	Address	Port	NIC
RTP	127.0.0.1	5050	lo

[Configure destinations](#)

Within the Stream destinations configuration section, configure the desired output stream for SRT. As with the Input configuration choose between 2 modes, Caller or Listener.

Figure 137. SRT Listener Mode Configuration



Stream destinations - Output Stream #1

Configure destinations for your output stream: Mouse over elements to see description

SRT: Any 5050 Enabled: ☒

SRT options: Listener None 25 % 240 ms

When SRT Listener mode is selected:

- Specify the port of the local machine where an external Caller unit will request a connection so the output which is being configured can start sending data.

- If **Any** interface is selected, the SRT connection on the selected port is accepted on all interfaces, automatically supporting redundant sources
- SRT Bonding (see "[SRT Bonding \(Redundancy\)](#)" on page 101) – Upon selecting a specific interface, a local IP which is listened on, may be also specified

Figure 138. SRT Caller Mode Configuration

When SRT Caller mode is selected:

- Specify the of the remote machine where the external unit is waiting to receive data

SRT Overhead

Define the SRT overhead parameter value which an amount of % over the Total Bitrate that can be surpassed in order to achieve the lost data recovery. Maximum used connection bitrate is equal to configured Total Bitrate + SRT overhead. In general, this is an upper limit and connections do not require it for normal operation.

SRT Encryption

As with Input configurations, SRT encryption is also supported on Output. From the drop-down, select which cipher will be used. The available options are AES-128, AES-192, and AES-256.

AES-256 encryption is recommended whenever possible along with a strong passphrase.

Stream ID

In SRT Caller mode, optional stream id information string can be added. This string is sent to the Listener before connecting. If the field is left empty, the functionality is disabled. Up to 512 characters can be entered.

SRT Bonding (Redundancy)

SRT bonding enhances reliability by routing traffic across multiple IP paths simultaneously, using socket groups to manage the redundant connections. A typical setup connects the BRIDGE LIVE IP to two networks from different providers.

- Listener – Set the network interface to "Any". All member paths must use the same UDP port on both the Listener and Caller. A single listener should be set to ANY network interface and UDP port must be the same for redundant caller.
- Caller – Select a different interface/IP for each redundant path to form a socket group, ensuring the same UDP port is used across all paths.

NOTE: Only Broadcast mode is supported (ensures 100% seamless protection). Main/Backup mode is not supported.

Dolby E Passthrough

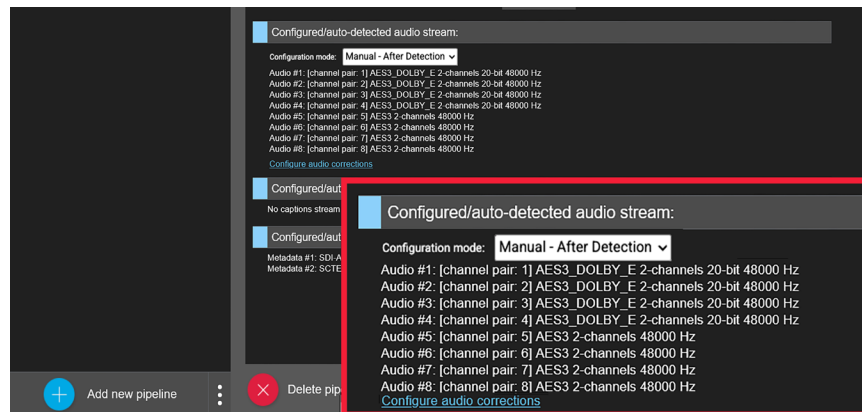
BRIDGE LIVE IP supports 20-bit Dolby-E passthrough. The Dolby-E passthrough feature provides the capability to receive and send Dolby-E within MPEG-TS audio. This feature does not provide access to decode or encode to/from Dolby-E and AES-3; it is only a passthrough feature. The Dolby E flag must be present for the data to be recognized and applied correctly.

NOTE: 16-bit Dolby E is not supported.

Configuration of MPEG-TS Input

- Select MPEG-TS input Type
- Auto detects Dolby E and presents on the audio channels

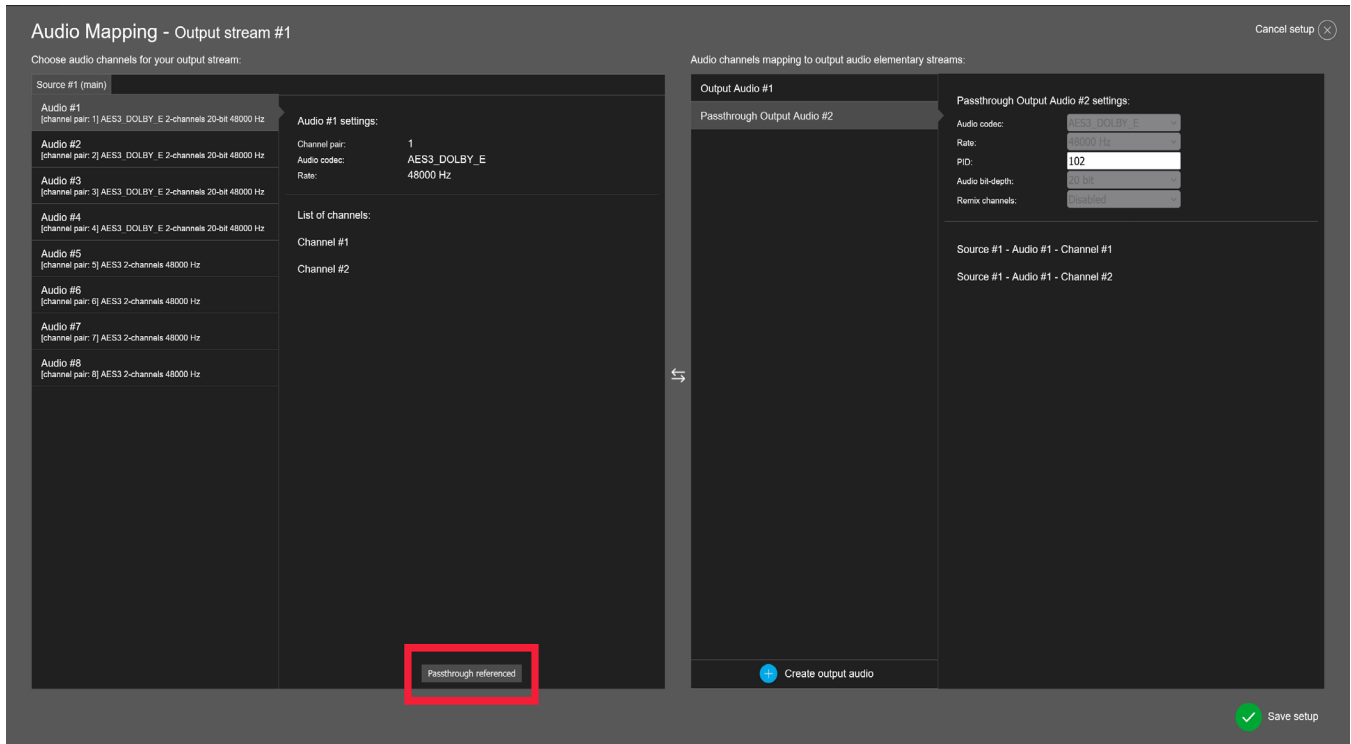
Figure 139. 20bit Dolby E Passthrough Input Configuration



Configuration of Dolby E Passthrough Output

- Under 'Output stream audio configuration options', click on 'Change audio mapping'.
- When building an output pipeline, highlight the desired Dolby-E channels, then select 'Passthrough referenced'.
- The mapping will automatically set those output types to Dolby-E for passthrough.

Figure 140. 20bit Dolby E Passthrough Output Configuration



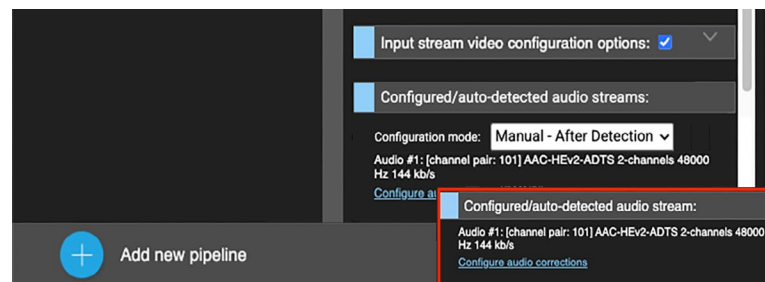
AAC-HE Decode and Encode

BRIDGE LIVE IP supports decoding and encoding of AAC-HE audio from compressed streams.

Configuration of Input with AAC-HE Audio

- Select input.
- Auto detects AAC-HE and presents on the audio channels.

Figure 141. AAC-HE Input Configuration

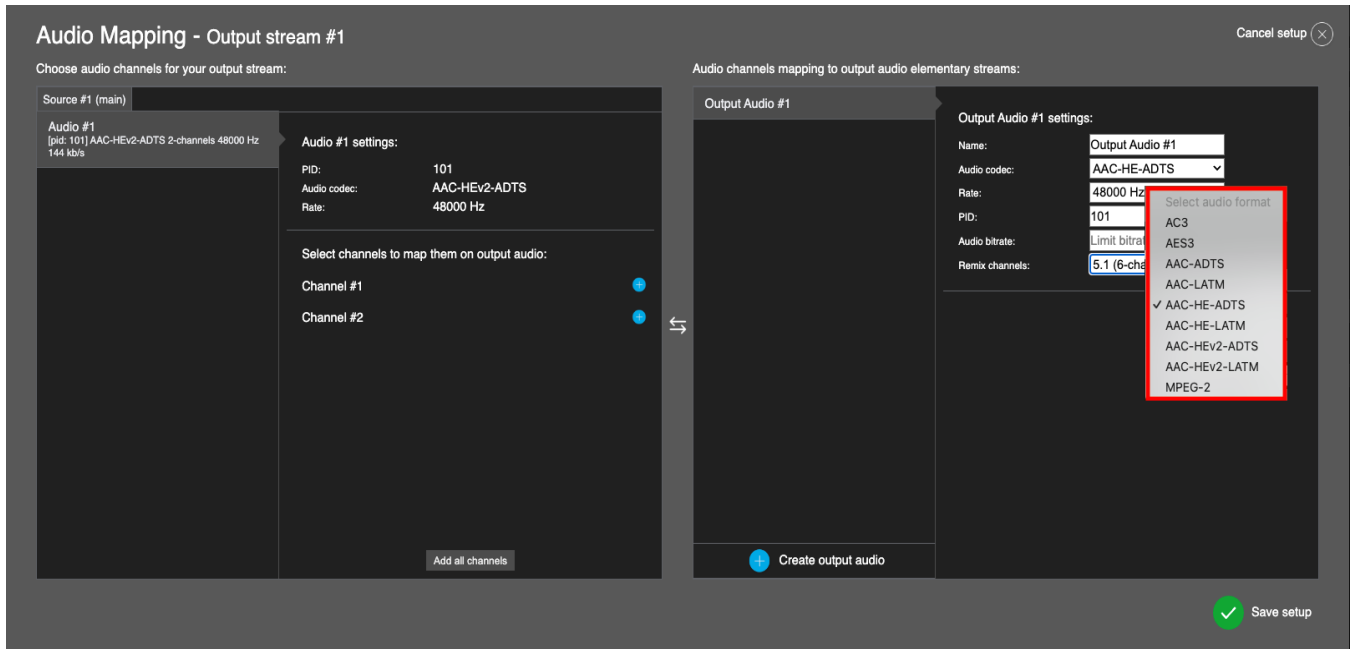


Configuration of AAC-HE Output

- Under 'Output stream audio configuration options', click on 'Change audio mapping'. Under 'Output stream audio configuration options', click on 'Change audio mapping'.

- When building an output pipeline, click on **Audio codec** and select an AAC-HE codec. The following codecs are supported:
 - AAC-HE-ADTS
 - AAC-HE-LATM
 - AAC-HEv2-ADTS
 - AAC-HEv2-LATM

Figure 142. AAC-HE Output Configuration



SFP Selection

Although AJA does not make specific recommendations for SFPs, several models from different companies have been tested for various AJA products with good success.

It is the customers' responsibility to ensure the selected SFP models are validated in their systems and that compatible SFPs are used on both ends of a fiber.

Verify that the brand and speed of the SFP selected is supported by the Ethernet Switch being used with BRIDGE LIVE IP. See ["SFP Options" on page 105](#) for suggested SFPs.

Table 3. SFP Options

Manufacturer	Type	Length	Model Number
Mikrotik	SFP28 DAC	1m	XS+DA0001
Mikrotik	SFP28 DAC	3m	XS+DA0003
Mikrotik	QSFP100 > 4xSFP28 DAC	3m	XQ+BC0003-XS+
Cisco	SFP28 DAC	3m	SFP-H25G-CU3M
Cisco	QSFP100 > 4xSFP28 DAC	3m	QSFP28-4X25G-CU3
FS	QSFP100 > 4xSFP28 DAC	3m	QSFP-4x25G-3M
Accelink	SFP28 SR	100m	RTXM330-551
Mikrotik	SFP28 SR	100m	XS+85LC01D
FS	SFP28 SR	100m	SFP-25G-MR-SR

IMPORTANT: Ethernet speeds must match: 25GbE must feed 25GbE, 10GbE must feed 10GbE. Multi-rate 10/25GbE SFPs can be used but ensure the speed is set correctly at each end.

25GBASE-SR SFPs (SR => Short range) use 850nm wavelength over Multimode fiber up to 100m of OM4 fiber (70m of OM3).

25GBASE-LR SFPs (LR => Long range) use 1310nm wavelength over Single Mode fiber up to 10km.

IMPORTANT: Other options exist so be sure to match SFP capabilities with the correct fiber type.

Chapter 5 – Interoperability

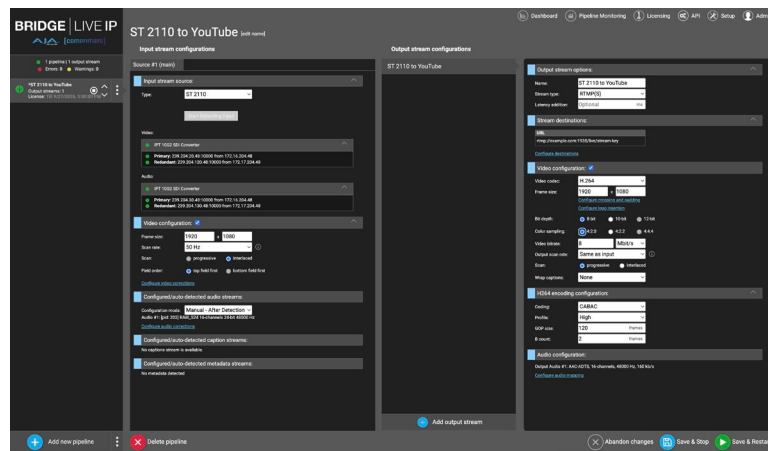
Example of Streaming to YouTube

NOTE: The last steps about the stream URL and key are critical elements.

In this example, we assume that you already have a pipeline setup that has a streaming output. We are going to add an output stream to that pipeline for streaming to YouTube.

Adding an Output Stream for YouTube

Figure 143. Configuring a new output stream for streaming to YouTube

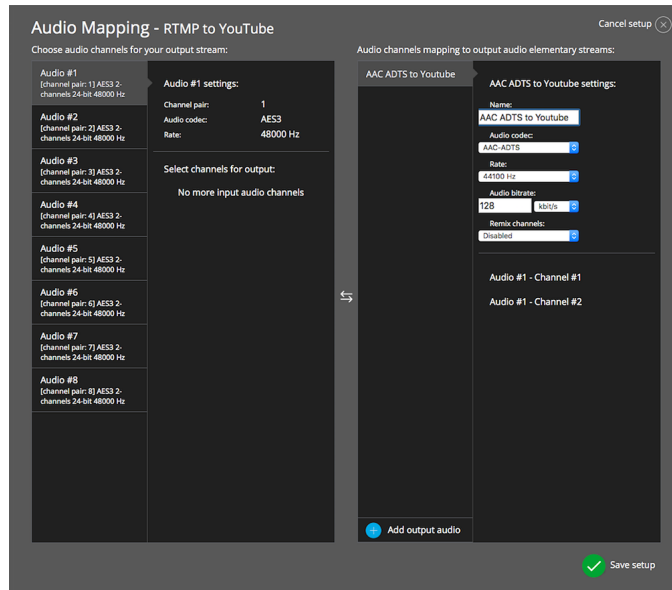


1. Click **Add output stream**.
2. Under Output stream options, provide a name for your new output stream.
3. Set Stream type to RTMP(S).
4. Under Output stream video configuration options, set Video codec to H.264.
5. Set Frame size to your desired YouTube resolution, for example, 1920x1080.
6. Set Bit depth to 8-bit.
7. Set Color sampling to 4:2:0.
8. Set Video bit rate to the YouTube recommended rate of 3 to 6 Mbit for 1080p23.97 to 1080p30.
9. Set Scan rate to match the video input scan rate (can be half for high frame rate inputs if desired).
10. Set Scan to progressive (YouTube prefers progressive video).
11. Under H.264 encoding options, set Coding to CABAC.
12. Set Profile to Main.
13. Set GOP size to 2x the frame rate. For example, 1080p29.97 = GOP of 60).

Audio Settings

1. Under Output stream audio configuration options, click Change audio mapping.

Figure 144. Audio Mapping RTMP to YouTube

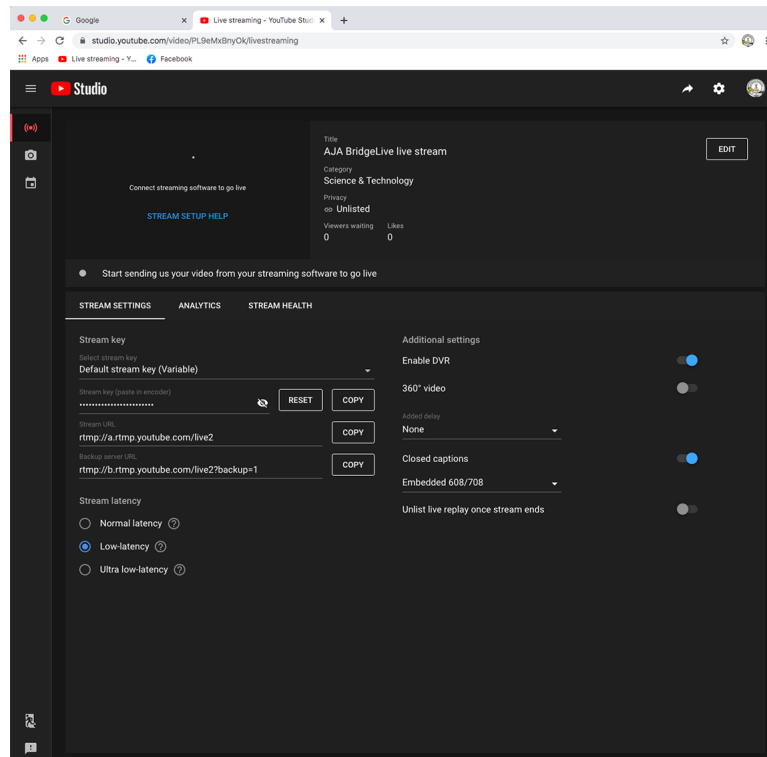


2. Name your Output Audio settings.
3. Select AAC-ADTS under Audio codec.
4. Set Rate to 44100 Hz.
5. Set Audio bit rate to 128 kbit/s.
6. Click **Save setup**.

YouTube Studio Live Streaming Page

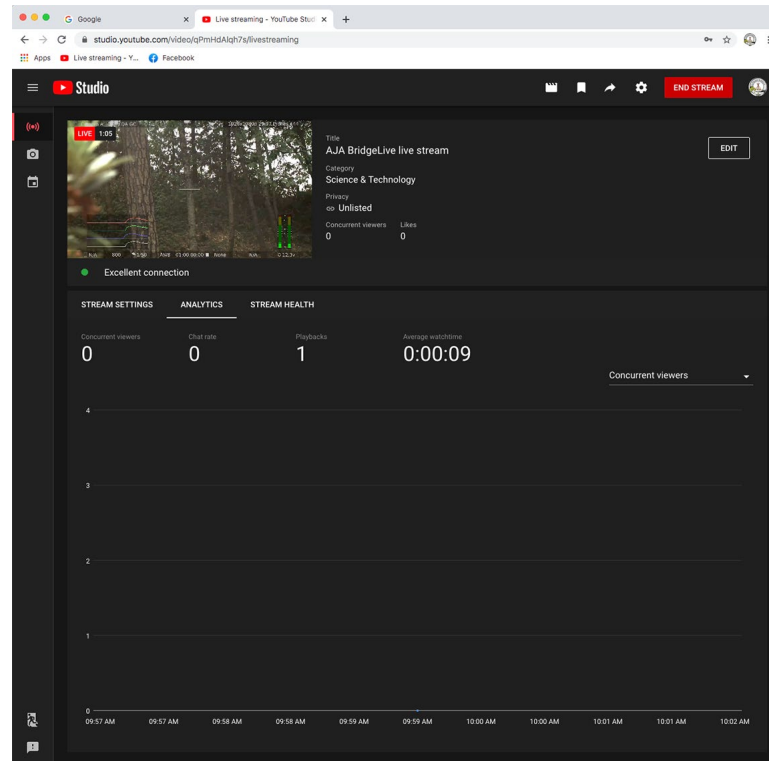
1. Go to your YouTube Studio live streaming page.

Figure 145. YouTube Studio Live Streaming Page



2. Copy the Stream URL.
3. Paste the stream URL into **URL address with stream key** field under Output stream destination of pipeline Output stream mapping.
4. Go back to the YouTube Studio live streaming page.
5. Copy the Stream key.
6. Go back to the RTMP **URL address with stream key** field.
7. Add a "/" to end of the pasted URL address, then paste in the copied stream key.
8. Apply configuration.

Figure 146. YouTube Studio Live Stream Page Now Streaming



Streaming to Wowza Live Video Streaming Platform

If you wish to stream to Wowza, note that you can provide authentication through the URL format.

Destination Syntax Examples

See the following destination syntax examples:

- `rtmp://USERNAME:PASSWORD@address:1935/live`
- `rtmp[s]://[user:pass@]example.com:19xx/live/stream-key`

Please see <https://www.wowza.com/> for more detailed information.

Chapter 6 – Using the REST API

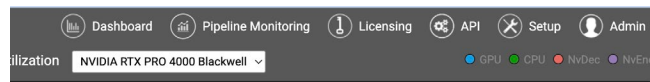
The REST API is accessed with standard methods, including through the browser URL field and through Curl commands.

Can use other methods too. Can use through web browser. For automation, would use something like Curl. But it is a typical REST API in terms of how someone would access and use it.

Accessing the API Documentation

BRIDGE LIVE IP is REST API ready. You can access the complete API documentation by selecting the API button in the top right corner of Dashboard.

Figure 147. The API button



Featured Curl commands

The API documentation is extensive. However, the following list of certain Curl commands may be especially useful as you get started:

list network interfaces

- `$ curl 'http://localhost:8080/api/system/network-interfaces' -i -H 'Accept: application/json'`

list all available pipelines

- `$ curl 'http://localhost:8080/api/pipelines' -i -H 'Accept: application/json'`

add simple pipeline with input stream data

- `$ curl 'http://localhost:8080/api/pipeline' -i -X POST -H 'Content-Type: application/json' -d '{ "name": "pipeline 3", "source": "udp://127.0.0.1:5000:lo", "complianceWith": "TR_01", "video": { "format": "J2K", "width": 1920, "height": 1080, "sampling": "4:2:2", "depth": 10, "framerate": "24", "fieldOrder": "PROGRESSIVE" } }`

get the state of pipeline with ID 0

- `$ curl 'http://localhost:8080/api/pipeline/0/state' -i -H 'Accept: application/json'`

Retrieving SDP files via the REST API

To retrieve an SDP file for a specific receiver or sender, retrieve the ID of the pipeline which contains the receiver or sender. This ID is found in the pipeline JSON which can be downloaded from within the UI.

The API call:

`http://yourserver-IP:80/api/pipeline/{id}/state`

returns a JSON describing the pipeline state. Find the unique *id* field. This is the equivalent to the NMOS device_id.

Next, list all receivers or senders with the API call:

http://yourserver-IP:80/x-nmos/node/v1.3/receivers

or

http://yourserver-IP:80/x-nmos/node/v1.3/senders

From this list, find the id field of the intended receiver or sender which has a matching device_id. To distinguish video vs. audio receivers, use the label field. It has a value in the form of "{pipeline_name}/Video" or "{pipeline_name}/Audio#{audio_index}" (ex. "Pipeline/Audio#3").

The label field can also be used to identify a sender. Its label has the form of "{pipeline_name}/{output_stream_name}/Sender" (ex. "Pipeline/Output Stream #1/Sender").

With the id of the receiver or sender, use the following API calls:

Receiver

- *http://yourserver-IP:80/x-nmos/connection/v1.1/single/receivers/{receiver_id}/active*
 - SDP file is in the transport_file field of the JSON response

Sender

- *http://yourserver-IP:80/x-nmos/connection/v1.1/single/senders/{sender_id}/transportfile*
 - SDP file is the response body

Chapter 7 – Using SNMP

BRIDGE LIVE IP Server SNMP Enabled by Default

BRIDGE LIVE IP server uses SNMPv2 and is enabled by default. If you need to disable SNMP on the BRIDGE LIVE IP, please contact AJA Support.

BRIDGE LIVE IP Server SNMP Disabled by Default

BRIDGE LIVE IP SNMP functions are disabled by default. However, you can enable it by editing the `snmp_enable` entry line in the active .ini file Advanced Settings to the value of "1".

For example:

`snmp_enable=1`

To modify this setting, see ["Advanced Setup" on page 43](#).

Example of SNMP Commands

It is possible to automate system monitoring with the Simple Network Management Protocol (SNMP). Below is the list of commands that you may use.

NOTE: The monitoring only works while the BRIDGE LIVE IP is actually transcoding. You will not see a correct response if the system is idle.

CPU utilization

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.4.1.2021.11.9`

GPU utilization

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.4.1.50087.1.1.4.1.3`

Available GPUs

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.4.1.50087.1.1.4.1.2`

Inbound streams

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.4.1.50087.1.2.2.1`

Outbound streams

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.4.1.50087.1.2.3.1`

Dropped frames

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.4.1.50087.1.2.3.1.8`

Overall status

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.4.1.50087.1.1.3.1`

Network received data

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.2.1.2.2.1.10`

Network transmitted data

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.2.1.2.2.1.16`

Network interfaces

`snmpwalk -v2c -cpublic <IP> .1.3.6.1.2.1.2.2.1.2`

Obtaining the name of an object in a tree

– outputs COMPRIMATO-SYSTEMS-MIB:cmpto
`snmptranslate .1.3.6.1.4.1.50087`

Obtaining the location of a certain object from MIB

– outputs .1.3.6.1.4.1.50087.1.1.3
`snmptranslate -On COMPRIMATO-SYSTEMS-MIB:trcOutputStreamTable`

SNMP Traps

BRIDGE LIVE IP uses standard SNMP traps. SNMP traps are used to send event messages. An event has a start and an end which are conveyed by event messages. Below is an example of events we use:

- user launched a pipeline
- user stopped a pipeline
- a pipeline crashed
- the device is receiving no input
- the device is producing no output
- some frames are being dropped by the transcoder
- invalid data on input

Each event has assigned a severity, which can be:

- info(0)
- warning(1)
- error(2)
- clear(3)

Events get cleared by a trap containing an event message with severity clear(3). Event messages regarding the same event are linked together by the same `trcEventKey`.

`trcEvent` structure:

- `trcEventIndex`
- `trcEventKey`
- `trcEventObject`
- `trcEventObjectName`

- trcEventSeverity
- trcEventText
- trcEventCreatedTime

The event message contains all necessary information about the event:

- eventObject – OID of the alarming object within the node having the alarm
- eventObjectName – human-friendly name of the alarming object
- severity – the severity of the event (CLEAR - add)
- text – an event text providing more information about the issue
- createTime – time when the event was raised/cleared

There are also two related tables – lastEventsTable and activeEventsTable.

lastEventsTable contains the 10 most recent event messages (one row for each sent trap). activeEventsTable contains all raised events which have not been cleared yet, alongside the four most recently cleared ones.

OIDs of relevant tables:

- lastEventsTable .1.3.6.1.4.1.50087.1.1.2.1
- activeEventsTable .1.3.6.1.4.1.50087.1.1.3.1

Configuration of SNMP Manager

You can find the MIB file in BRIDGE LIVE IP here:

`/usr/share/snmp/mibs/COMPRIMATO-SYSTEMS-MIB.txt`

Setup to configure the SNMP agent:

- open `/etc/snmp/snmpd.conf` for editing as `sudo`,
- find the line that reads `"trap2sink localhost public"`,
- replace `"localhost"` with the IP address of the SNMP manager. The line should then look like this:
`"trap2sink 172.12.5.123 public"`,
- save the file,
- restart SNMP services: `"sudo systemctl restart snmpd"` and `"sudo systemctl restart snmptrapd"`.

Chapter 8 – Troubleshooting

How can I collect BRIDGE LIVE IP log files?

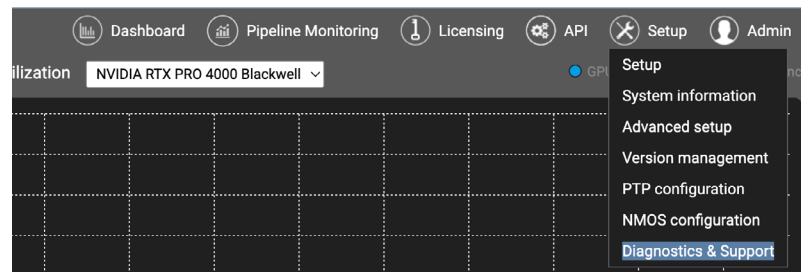
You can see logs in the folder:

`/opt/transcoder/transcoder/logs/`

If you need to send logs to Support, please copy the contents of the folder, archive them and share.

Alternatively, you can download them from the Diagnostics and Support page. To access the page, select **Diagnostics & Support** from the Setup menu in the upper right area of Dashboard.

Figure 148. Accessing Diagnostics and Support page from the Setup menu



From the Diagnostics and Support page, click **Create and download diagnostic report**. The diagnostic report will download to your computer. The report contains system information, pipeline configuration information, pipeline error messages, and system logs. Please send the diagnostic report to AJA Support (support@aja.com).

How can I change the default system password?

BRIDGE LIVE IP installation runs on Rocky Linux 9, and you can use standard system commands. If you need to change the password for user "myuser" then use the command:

```
sudo passwd myuser
```

in the system terminal. You can access the terminal window with the keyboard shortcut Ctrl + Alt + F1 while browsing the BRIDGE LIVE IP UI.

How can I change the admin password?

We have a script ready that can change the admin password. Switch to the system console environment (described above) and navigate to `/opt/transcoder/` where there is a script `set_ui_password.sh` that will accomplish the task. Run the script with sudo permissions.

For additional information see "[Password Administration](#)" on page 24.

The UI shows streams are working but no data on output.

It is highly probable that there is an issue on the network and the data are being lost in transmission. Please verify that the network route is accessible between devices (source, BRIDGE LIVE IP, receiver) including firewall settings, which may be configured to block BRIDGE LIVE IP-related traffic (e.g., ports). You can use Wireshark to verify whether your target machine is receiving network data, or VLC to visualize the content.

I see frame drops in the UI. What can be the cause?

There are two possible causes – flaws in the input, or performance bottlenecks. The rule of thumb is to investigate whether drops occur when the machine is not fully utilized. If so, the problem may be in the input itself when some frames can be corrupted by losses during network transmission or compatibility issues.

The other case is that high workload is responsible for frame drops; for example, high utilization of HW resources (CPU, GPU, NI). Try to lower the performance drain by stopping some streams and observe the situation further.

Another possibility is to configure the Pipeline to have higher Total bit rate overhead over Video bit rate. Sometimes, the video bit rate fluctuation is higher, which causes the video stream to not be able to fit into the overall data limit, resulting in dropped frames.

What if BRIDGE LIVE IP fails?

Chromium can restart itself, however, this is restricted for BRIDGE LIVE IP because there is a possibility to get into an infinite loop due to a bad config file. Instead, use the system's tools to (re)start the BRIDGE LIVE IP.

```
sudo systemctl stop transcoder-base
```

Use to turn off the service and use the following command to investigate service logs; alternatively you can also edit config .json files (located `/opt/transcoder/`)

```
sudo journalctl -u transcoder-base
```

and start the service again

```
sudo systemctl start transcoder-base
```

In case this procedure fails to reinitiate the correct operation of BRIDGE LIVE IP, try to reboot the BRIDGE LIVE IP. If the problem is still not resolved, contact AJA Support.

What to do if BRIDGE LIVE IP can't boot the OS?

If a version upgrade has been performed at some point, boot into an older version of BRIDGE LIVE IP firmware. For more details, see ["Factory Reset" on page 23](#).

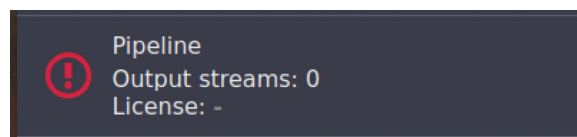
How to access the system administration environment?

Use the Linux OS standard shortcut Ctrl + Alt + F1 to switch the view. Use the Linux commands to operate the system. Using Ctrl + Alt + F2 returns to the UI..

A list of possible error messages in the BRIDGE LIVE IP UI

Example of indication of errors in the UI.

Figure 149. Error Indicator



{pipeline} is not producing any data to destination

no video output is produced, rather the stream is filled with NULL packets; this message is normal during the pipeline initialization, otherwise, there may be a problem.

Some video frames are being dropped

a frame that cannot be processed (flawed images, high latency, etc.) by the pipeline, in a specified time slot, is dropped.

Stream {parameters} were not detected in source stream

provided stream parameters (width, height, frame rate or standard compliance) during configuration in UI do not match the auto-detected parameters from the input stream.

Video is being encoded at lower frame rate {xxx} than required {yyy}

video encoder is busy encoding too many streams, try to reduce the number of encoding streams.

Video is being decoded at lower frame rate {xxx} than required {yyy}

the video decoder is busy decoding too many frames. Try to reduce the number of input streams.

{Pipeline} is in unexpected state: {status}

contact AJA Support.

{Pipeline} is not receiving any PCR from source

BRIDGE LIVE IP cannot detect any input data or all PCR packets are dropped.

Pipeline creation failed! Nvidia GPU is required to run this pipeline with GPU postprocessor.

There are two possible explanations, either there is no Nvidia GPU in the BRIDGE LIVE IP system or the Nvidia driver is too old and BRIDGE LIVE IP was unable to enumerate GPU in the system.

How can I contact AJA Support?

Contact AJA Support at support@aja.com, or visit the <https://www.aja.com/support/contact> webpage.

Appendix A – Specifications

BRIDGE LIVE IP Tech Specs

Video Formats

- (UltraHD) 3840 x 2160p 25, 29.97, 30, 50, 59.94, 60
- (2k) 2560 x 1440p 25, 29.97, 30, 50, 59.94, 60
- (HD) 1920 x 1080p 25, 29.97, 30, 50, 59.94, 60
- (HD) 1920 x 1080i 50, 59.94, 60
- (HD) 1280 x 720P 50, 59.94,

Media Transport Interfaces (In-Band)

- Uncompressed media (SMPTE ST 2110-20, 30, 40)
- PTP
- Configuration & Control
- 2x SFP28 Cages (redundant only)- SFPs not included
- Supports 10GigE and 25GigE SFPs

Input Uncompressed IP

- ST 2110-20 Video
 - 16-channel input*
 - Rx support for Narrow and Wide Senders
 - RX support for Class-A,B,C ST 2022-7 redundancy

*Format and application dependent

- ST 2110-30 Audio
 - Up to 8 streams per pipeline*
 - Up to 64-channel audio per stream, 16-bit or 24-bit per channel, 48 kHz or 96 kHz synchronous*
 - 1ms and 125us timing

*Application dependent

- ST 2110-40 Ancillary
 - Up to 16 streams*

*Application dependent

Output Uncompressed IP

- ST 2110-20 Video
 - 16-channel output*
 - Tx support for ST 2022-7
 - Tx senders are Narrow Gapped

*Format dependent

- SMPTE ST 2110-30 Audio
 - Up to 12 streams per pipeline*
 - Up to 16-channel audio per stream, 16-bit or 24-bit per channel, 48 kHz or 96 kHz synchronous*
 - 1ms and 125us timing

*Application dependent

- SMPTE ST 2110-40 Ancillary
 - Up to 12 streams*

*Application dependent

Discovery, Registration and Control

- NMOS Tx/Rx support according to standards IS-04 v1.3 and IS-05 v1.1
- In-Band and Out-of Band
- L2, L3 with SSM
- IGMP v2, v3

IP Clock

- PTPv2 ST 2059-2 / IEEE 1588-2008
- In-Band only

Video Color Component Sampling

- ST 2110-20
 - YCbCr, 4:2:2, 10-bit
- Transport Streams
 - YCbCr, 4:2:2, 10-bit/8-bit
 - YCbCr, 4:2:0, 10-bit/8-bit
- NDI
 - 10-bit via P216, 4:2:2, 16-bit
 - 8-bit, UYVY, 4:2:2
 - HDR metadata Manual Marking

Video Codecs

- H.264 (AVC, MPEG-4)
- H.265 (HEVC)
- JPEG 2000 (VSF TR-01)
- H.262 (MPEG-2)
- NDI
- JPEG XS (VSF TR-07)

Audio Streams/Codecs

- AAC-LC (ADTS, LATM)
- AAC-HE (ADTS, LATM)
- AAC-HE v1 & v2 (ADTS, LATM)
- AC3
- E-AC3 (input)
- Dolby E pass-through
- MPEG-2 Audio
- NDI (uncompressed float)
- Uncompressed PCM multi-channel (SMPTE 302M-2007)
- ST 2110-30 Uncompressed audio

Metadata

- MPEG-2 ancillary packet support (SMPTE 2038)
- Closed Captioning (EIA-608/708)
- Line 21 Captions
- Metadata pass-through
- SCTE-35, SCTE-104
- Subtitles embedded within H.264 SEI messages
- Timecode embedded within HEVC and H.264 SEI messages
- Electronic program guide (EPG) on input
- ST 2110-40 Ancillary data

Containers and Protocols

- HLS (input)
 - AVC TS segments
 - Fragmented MP4
- HLS (output)
 - AVC TS segments
- MPEG-TS
- MPTS (input)
- RTMP
- RTMPS (output)
- RTP, UDP
- SRT (including encryption)
- VSF TR-01
- VSF TR-07

Video Processing

- Auto Color Component Sampling based on I/O settings
- Cropping / Padding
- Color adjustments
- Deinterlacing
- Frame rate 50% down-conversion (60p->30p, 59.94->29.97, 50p->25p)
- Frame rate up-conversion (50i->50p)
- Logo insertion
- Resizing

Audio Processing

- Channel Remapping
- Gain
- Sample Rate conversion
- Up/Down-mixing (e.g. 5.1 to stereo and vice versa)
- Audio delay

Synchronization

- Input PCR
 - Global configuration (in separate transport stream)
 - Local configuration (in each transport stream)
- Output PTS
 - Pass-through
 - Add offset to input PTS
- PCR
 - Decoder Synchronous Multi-Channel Transport

Configuration and Monitoring

- Local interface (keyboard, mouse and monitor)
- Remote access via Browser
- REST API
- SNMP
- NMOS
- IPMI

Form Factor

- 1RU turnkey system
- 2x SFP28 cages (10GigE and 25GigE compatible)
- 2x 10GigE RJ-45
- Local interface via Display Port and USB
- OS custom image
- Update and license via download

Size (w x d x h)

- 17.2" x 16.9" x 1.7" (436.88 x 429.26 x 43.18 mm)

Weight

- 28 lb. (12.7kg) in box
- 18 lb. (8.2kg) server only

Power

- 100-240 VAC 50/60 Hz (Dual, redundant power supplies)
- 320W typical, 600W Maximum

Environment

- Safe Operating Temperature: 5 to 35 C (41 to 95 F)
- Safe Storage Temperature (Power OFF): -40 to 60 C (-40 to 140 F)
- Operating Relative Humidity: 8-90% noncondensing
- Nonoperating Relative Humidity: 5-95% noncondensing

Appendix B – Safety and Compliance

Federal Communications Commission (FCC) Compliance Notices

Class A Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15, Subpart B of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian ICES Statement

Canadian Department of Communications Radio Interference Regulations

This digital apparatus does not exceed the Class A limits for radio-noise emissions from a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications. This Class A digital apparatus complies with Canadian ICES-003.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada. Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

European Union, European Free Trade Association (EFTA) and United Kingdom Regulatory Compliance

This equipment may be operated in the countries that comprise the member countries of the European Union, European Free Trade Association and the United Kingdom. These countries, listed in the following paragraph, are referred to as The European Community throughout this document:

AUSTRIA, BELGIUM, BULGARIA, CROATIA, CZECH REPUBLIC, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, ICELAND, IRELAND, ITALY, LATVIA, LIECHTENSTEIN, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, NORWAY, POLAND, PORTUGAL, REPUBLIC OF CYPRUS, ROMANIA, SLOVAK REPUBLIC, SLOVENIA, SPAIN, SWEDEN, SWITZERLAND, UNITED KINGDOM

Declaration of Conformity

Marking by these symbols indicates compliance with the Essential Requirements of the EMC Directive of the European Union 2014/30/EU.



This equipment meets the following conformance standards:

EN 62368-1: 2014 + A11 (T-Mark License),

IEC 62368-1: 2014; (CB Scheme Certificate)

Additional licenses issued for specific countries available on request.

Emissions

EN 55032: 2015 + A11: 2020, CISPR 32: 2015,

EN 61000-3-2: 2014, EN 61000-3-3: 2013

Immunity

EN 55035: 2017 + A11: 2020, EN 61000-4-2:2009,

EN 61000-4-3: 2006 + A1:2008 + A2:2010,

EN 61000-4-4: 2012, EN 61000-4-5: 2014 + A1: 2017, EN 61000-4-6: 2014,

EN 61000-4-11: 2020



Warning! This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.

Achtung! Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention! Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

Recycling Notice



This symbol on the product or its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste for recycling, please contact your local authority, or where you purchased your product.

Korea KCC Compliance Statement

사용자안내문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Taiwan Compliance Statement

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

This is a Class A product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438, Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Japan Compliance Statement

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

This is a Class A product based on the standard of the VCCI Council (VCCI 32: 2016). If this equipment is used in a domestic environment, radio interference may occur, in which case, the user may be required to take corrective actions.

China Compliance Statement

This product has been tested to the following Chinese standards:

GB/T 13837-2012; GB 17625.1-2012; GB 8898-2011; GB/T 9254-2008 (Class A)

This is to certify that the above mentioned product(s) complies with the requirements of certification rules of CQC12-045800-2022 under certificate number CQC2021010805367344.

Translated Warning and Caution Messages

The following caution statements, warning conventions, and warning messages apply to this product and manual.



Warning Symbol



Hazard Symbol



Caution Symbol

Before Operation Please Read These Instructions



Warning! Read and follow all warning notices and instructions marked on the product or included in the documentation.

Avertissement! Lisez et conformez-vous à tous les avis et instructions d'avertissement indiqués sur le produit ou dans la documentation.

Warnung! Lesen und befolgen Sie die Warnhinweise und Anweisungen, die auf dem Produkt angebracht oder in der Dokumentation enthalten sind.

¡Advertencia! Lea y siga todas las instrucciones y advertencias marcadas en el producto o incluidas en la documentación.

Aviso! Leia e siga todos os avisos e instruções assinalados no produto ou incluídos na documentação.

Avviso! Leggere e seguire tutti gli avvisi e le istruzioni presenti sul prodotto o inclusi nella documentazione.



Warning! Do not use this device near water and clean only with a dry cloth.

Avertissement! N'utilisez pas cet appareil près de l'eau et nettoyez-le seulement avec un tissu sec.

Warnung! Das Gerät nicht in der Nähe von Wasser verwenden und nur mit einem trockenen Tuch säubern.

¡Advertencia! No utilice este dispositivo cerca del agua y límpielo solamente con un paño seco.

Aviso! Não utilize este dispositivo perto da água e limpe-o somente com um pano seco.

Avviso! Non utilizzare questo dispositivo vicino all'acqua e pulirlo soltanto con un panno asciutto.



Warning! Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

Avertissement! Ne bloquez aucune ouverture de ventilation. Suivez les instructions du fabricant lors de l'installation.

Warnung! Die Lüftungsöffnungen dürfen nicht blockiert werden. Nur gemäß den Anweisungen des Herstellers installieren.

¡Advertencia! No bloquee ninguna de las aberturas de la ventilación. Instale de acuerdo con las instrucciones del fabricante.

Aviso! Não obstrua nenhuma das aberturas de ventilação. Instale de acordo com as instruções do fabricante.

Avviso! Non ostruire le aperture di ventilazione. Installare in conformità con le istruzioni del fornitore.



Warning! Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Avertissement! N'installez pas l'appareil près d'une source de chaleur telle que des radiateurs, des bouches d'air de chauffage, des fourneaux ou d'autres appareils (amplificateurs compris) qui produisent de la chaleur.

Warnung! Nicht in der Nähe von Wärmequellen wie Heizkörpern, Heizregistern, Öfen oder anderen Wärme erzeugenden Geräten (einschließlich Verstärkern) aufstellen.

¡Advertencia! No instale cerca de fuentes de calor tales como radiadores, registros de calor, estufas u otros aparatos (incluidos amplificadores) que generan calor.

Aviso! Não instale perto de nenhuma fonte de calor tal como radiadores, saídas de calor, fogões ou outros aparelhos (incluindo amplificadores) que produzam calor.

Avviso! Non installare vicino a fonti di calore come termosifoni, diffusori di aria calda, stufe o altri apparecchi (amplificatori compresi) che emettono calore.



Warning! 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 are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Avertissement! La sécurité de la prise polarisée ou de la prise de type mise à la terre ne doit en aucun cas être empêchée de fonctionner. Une prise polarisée a deux broches, l'une étant plus large que l'autre. Une prise de type mise à la terre a deux broches et une troisième broche pour la mise à la terre. La broche large ou la troisième broche sont fournies pour votre sécurité. Si la prise fournie ne s'insère pas dans votre prise femelle, consultez un électricien pour le remplacement de la prise femelle obsolète.

Warnung! Der Sicherheitszweck des gepolten bzw. Schukosteckers ist zu berücksichtigen. Ein gepolter Stecker verfügt über zwei Pole, von denen einer breiter als der andere ist. Ein Schukostecker verfügt neben den zwei Polen noch über einen dritten Pol zur Erdung. Der breite Pol bzw. der Erdungspol dienen der Sicherheit. Wenn der zur Verfügung gestellte Stecker nicht in Ihren Anschluss passt, konsultieren Sie einen Elektriker, um den veralteten Anschluss zu ersetzen.

¡Advertencia! No eche por tierra la finalidad del tipo de enchufe polarizado con conexión a tierra. Un enchufe polarizado tiene dos espigas, una más ancha que la otra. Un enchufe con conexión a tierra tiene dos espigas iguales y una tercera espiga que sirve para la conexión a tierra. La espiga ancha, o la tercera espiga, sirven para su seguridad. Si el enchufe suministrado no encaja en el tomacorriente, consulte con un electricista para reemplazar el tomacorriente obsoleto.

Aviso! Não anule a finalidade da segurança da ficha polarizada ou do tipo ligação terra. Uma ficha polarizada tem duas lâminas sendo uma mais larga do que a outra. Uma ficha do tipo de ligação à terra tem duas lâminas e um terceiro terminal de ligação à terra. A lâmina larga ou o terceiro terminal são fornecidos para sua segurança. Se a ficha fornecida não couber na sua tomada, consulte um electricista para a substituição da tomada obsoleta.

Avviso! Non compromettere la sicurezza della spina polarizzata o con messa a terra. Una spina polarizzata ha due spinotti, di cui uno più largo. Una spina con messa a terra ha due spinotti e un terzo polo per la messa a terra. Lo spinotto largo o il terzo polo sono forniti per motivi di sicurezza. Se la spina fornita non si inserisce nella presa di corrente, contattare un elettricista per la sostituzione della presa obsoleta.



Warning! Since the Mains plug is used as the disconnection for the device, it must remain readily accessible and operable.

Avertissement! Puisque la prise principale est utilisée pour débrancher l'appareil, elle doit rester aisément accessible et fonctionnelle.

Warnung! Da der Netzstecker als Trennvorrichtung dient, muss er stets zugänglich und funktionsfähig sein.

¡Advertencia! Puesto que el enchufe de la red eléctrica se utiliza como dispositivo de desconexión, debe seguir siendo fácilmente accesible y operable.

Aviso! Dado que a ficha principal é utilizada como a desconexão para o dispositivo, esta deve manter-se prontamente acessível e funcional.

Avviso! Poiché il cavo di alimentazione viene usato come dispositivo di sconnessione, deve rimanere prontamente accessibile e operabile.



Warning! Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the device.

Avertissement! Protégez le cordon d'alimentation pour que l'on ne marche pas dessus ou qu'on le pince, en particulier au niveau des prises mâles, des réceptacles de convenance, et à l'endroit où il sort de l'appareil.

Warnung! Vermeiden Sie, dass auf das Netzkabel getreten oder das Kabel geknickt wird, insbesondere an den Steckern, den Steckdosen und am Kabelausgang am Gerät.

¡Advertencia! Proteja el cable de corriente para que no se le pise ni apriete, en especial cerca del enchufe, los receptáculos de conveniencia y el punto del que salen del equipo.

Aviso! Proteja o cabo de alimentação de ser pisado ou de ser comprimido particularmente nas fichas, em tomadas de parede de conveniência e no ponto de onde sai do dispositivo.

Avviso! Proteggere il cavo di alimentazione in modo che nessuno ci cammini sopra e che non venga schiacciato soprattutto in corrispondenza delle spine e del punto in cui esce dal dispositivo.



Warning! Unplug this device during lightning storms or when unused for long periods of time.

Avertissement! Débranchez cet appareil pendant les orages avec éclaircies s'il est inutilisé pendant de longues périodes.

Warnung! Das Gerät ist bei Gewitterstürmen oder wenn es über lange Zeiträume ungenutzt bleibt vom Netz zu trennen.

¡Advertencia! Desenchufe este dispositivo durante tormentas eléctricas o cuando no se lo utilice por largos periodos del tiempo.

Aviso! Desconecte este dispositivo da tomada durante trovoadas ou quando não é utilizado durante longos períodos de tempo.

Avviso! Utilizzare soltanto i collegamenti e gli accessori specificati e/o venduti dal produttore, quali il treppiedi e l'esoscheletro.



Warning! Refer all servicing to qualified service personnel. Servicing is required when the device 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 device, the device has been exposed to rain or moisture, does not operate normally, or has been dropped.

Avertissement! Référez-vous au personnel de service qualifié pour tout entretien. L'entretien est exigé quand l'appareil a été endommagé de quelque manière que ce soit, par exemple lorsque le cordon d'alimentation ou la prise sont endommagés, que du liquide a été versé ou des objets sont tombés dans l'appareil, que l'appareil a été exposé à la pluie ou à l'humidité, ne fonctionne pas normalement ou est tombé.

Warnung! Das Gerät sollte nur von qualifizierten Fachkräften gewartet werden. Eine Wartung ist fällig, wenn das Gerät in irgendeiner Weise beschädigt wurde, wie bei beschädigtem Netzkabel oder Netzstecker, falls Flüssigkeiten oder Objekte in das Gerät gelangen, das Gerät Regen oder Feuchtigkeit ausgesetzt wurde, nicht ordnungsgemäß funktioniert oder fallen gelassen wurde.

¡Advertencia! Consulte al personal calificado por cuestiones de reparación. El servicio de reparación se requiere cuando el dispositivo ha recibido cualquier tipo de daño, por ejemplo cable o espigas dañadas, se ha derramado líquido o se han caído objetos dentro del dispositivo, el dispositivo ha sido expuesto a la lluvia o humedad, o no funciona de modo normal, o se ha caído.

Aviso! Remeta todos os serviços de manutenção para o pessoal de assistência qualificado. A prestação de serviços de manutenção é exigida quando o dispositivo foi danificado mediante qualquer forma, como um cabo de alimentação ou ficha que se encontra danificado/a, quando foi derramado líquido ou caíram objectos sobre o dispositivo, quando o dispositivo foi exposto à chuva ou à humidade, quando não funciona normalmente ou quando foi deixado cair.

Avviso! Fare riferimento al personale qualificato per tutti gli interventi di assistenza. L'assistenza è necessaria quando il dispositivo è stato danneggiato in qualche modo, ad esempio se il cavo di alimentazione o la spina sono danneggiati, è stato rovesciato del liquido è stato rovesciato o qualche oggetto è caduto nel dispositivo, il dispositivo è stato esposto a pioggia o umidità, non funziona correttamente o è caduto.



Warning! Do not open the chassis. There are no user-serviceable parts inside. Opening the chassis will void the warranty unless performed by an AJA service center or licensed facility.

Avertissement! Ne pas ouvrir le châssis. Aucun élément à l'intérieur du châssis ne peut être réparé par l'utilisateur. La garantie sera annulée si le châssis est ouvert par toute autre personne qu'un technicien d'un centre de service ou d'un établissement agréé AJA.

Warnung! Öffnen Sie das Gehäuse nicht. Keine der Geräteteile können vom Benutzer gewartet werden. Durch das Öffnen des Gehäuses wird die Garantie hinfällig, es sei denn, solche Wartungsarbeiten werden in einem AJA-Service-Center oder einem lizenzierten Betrieb vorgenommen.

¡Advertencia! No abra el chasis. El interior no contiene piezas reparables por el usuario. El abrir el chasis anulará la garantía a menos que se lo haga en un centro de servicio AJA o en un local autorizado.

Advertência! Não abra o chassi. Não há internamente nenhuma peça que permita manutenção pelo usuário. Abrir o chassi anula a garantia, a menos que a abertura seja realizada por uma central de serviços da AJA ou por um local autorizado.

Avvertenza! Non aprire lo chassis. All'interno non ci sono parti riparabili dall'utente. L'apertura dello chassis invaliderà la garanzia se non viene effettuata da un centro ufficiale o autorizzato AJA.



Warning! Disconnect the external AC power supply line cord(s) from the mains power before moving the unit.

Avertissement! Retirez le ou les cordons d'alimentation en CA de la source d'alimentation principale lorsque vous déplacez l'appareil.

Warnung! Trennen Sie die Wechselstrom-Versorgungskabel vom Netzstrom, bevor Sie das Gerät verschieben.

¡Advertencia! Cuando mueva la unidad desenchufe de la red eléctrica el/los cable(s) de la fuente de alimentación CA tipo brick.

Advertência! Remova os cabos CA de alimentação brick da rede elétrica ao mover a unidade.

Avvertenza! Scollegare il cavo dell'alimentatore quando si sposta l'unità.



Warning! Only use attachments and accessories specified and/or sold by the manufacturer.

Avertissement! Utilisez seulement les attaches et accessoires spécifiés et/ou vendus par le fabricant.

Warnung! Verwenden Sie nur Zusatzgeräte und Zubehör angegeben und / oder verkauft wurde durch den Hersteller.

¡Advertencia! Utilice solamente los accesorios y conexiones especificados y/o vendidos por el fabricante.

Aviso! Utilize apenas equipamentos/acessórios especificados e/ou vendidos pelo fabricante.

Avviso! Utilizzare soltanto i collegamenti e gli accessori specificati e/o venduti dal produttore.



Hazard! High Voltage. This situation or condition can cause injury due to electric shock.

Avertissement! Tension élevée. Cette situation ou condition peut causer des blessures dues à un choc électrique.

Warnung! Hochspannung. Diese Situation oder Bedingung kann zu Verletzungen durch Stromschlag führen.

¡Advertencia! Alto voltaje. Esta situación o condición puede causar lesiones debidas a una descarga eléctrica.

Aviso! Alta Tensão. Esta situação ou condição pode causar danos devido a choques elétricos.

Avviso! Alta tensione. Questa situazione o condizione può causare lesioni a causa di scosse elettriche.



Warning! Dual Power Cord Notice—please read this. To reduce the risk of electrical shock, disconnect both power cords before servicing equipment.

Avertissement! Avis concernant la double alimentation électrique — à lire soigneusement. Pour éviter tout risque d'électrocution, débranchez les deux câbles électriques avant d'intervenir sur l'équipement.

Achtung! Hinweis auf Doppel-Netzkabel—bitte lesen. Um das Risiko eines Elektroschocks zu verringern, müssen beide Netzkabel ausgestöpselt werden, bevor die Vorrichtung gewartet wird.

Avvertenza. Avviso concernente il cavo di alimentazione doppio – leggere attentamente. Per ridurre il rischio di elettrocuzione, scollegare entrambi i cavi di alimentazione prima di eseguire la manutenzione o riparazioni di questo apparecchio.

Aviso! Aviso de Cabo Elétrico Duplo - por favor, leia isto. Para reduzir o risco de choque elétrico, desconecte ambos os cabos elétricos antes de fazer manutenção ao equipamento.

¡Advertencia! Aviso del doble cable de alimentación - leer esto por favor. Para reducir el riesgo de descarga eléctrica, desconecte ambos cables de alimentación antes de dar servicio al equipo.



Caution! To meet safety regulations for leakage current, connect the dual power supplies to separate branch circuits.

¡Advertencia! Para cumplir con las normas de seguridad para la corriente de fuga, conecte las dos fuentes de alimentación para circuitos derivados diferentes.

Attention! Pour répondre aux mesures de sécurité concernant le courant de fuite, raccorder les sources d'alimentation doubles à des circuits de dérivation distincts.

Warnung! Zur Erfüllung der Sicherheitsbestimmungen bezüglich Reststrom schließen Sie bitte die zwei Netzteile an unterschiedlichen Abzweigleitungen an.

Cuidado! Para atender aos regulamentos de segurança para correntes de fuga, conecte as fontes duplas a circuitos elétricos separados.

Attenzione! Per soddisfare le norme di sicurezza sulla corrente di perdita, collegare i doppi alimentatori a circuiti derivati separati.



Warning! Hazardous Voltages! The safe operation of this product requires that a protective earth connection be provided. This protective earth is provided by the grounding conductor in the equipment's supply cord. To reduce the risk of electrical shock to operator and service personnel, this ground conductor must be connected to an earthed ground.

Avertissement : tensions dangereuses — Pour utiliser ce produit en toute sécurité, il faut un raccordement à la terre. Ce raccordement s'effectue par l'intermédiaire du connecteur de terre dans le cordon d'alimentation de l'équipement. Pour réduire le risque d'électrocution de l'opérateur ou du personnel de maintenance, ce cordon avec conducteur de terre doit être branché sur une prise reliée à la terre.

Achtung! Gefährliche Spannungen — Sichere Bedienung dieses Geräts erfordert, dass ein Schutzleiteranschluss vorgesehen wird. Dieser Schutzleiteranschluss wird mittels der Erdungsleitung im Netzkabel der Vorrichtung vorgesehen. Um die Gefahr eines Elektroschocks für Bedien- und Wartungspersonal zu verringern, muss diese Erdungsleitung mit einer geerdeten Masse verbunden werden.

Avvertenza – Alte tensioni – Il funzionamento in sicurezza di questo prodotto richiede una presa di terra, che viene fornita dal conduttore di messa a terra presente nel cavo di alimentazione dell'apparecchio. Per ridurre il rischio di elettrocuzione per l'operatore e il personale di manutenzione, tale conduttore deve essere collegato a un punto al potenziale di terra.

Advertencia de voltajes peligrosos — El funcionamiento seguro de este producto requiere que se proporcione una conexión terrestre protegida. Esta protección terrestre es proporcionada por el conductor de conexión en la tierra del cable de alimentación del equipo. Para reducir el riesgo de descarga eléctrica al operador y el personal de servicio, este conductor de conexión de la tierra debe ser conectado a la misma tierra.

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AJA Video Systems, Inc. (AJA Video) warrants that the hardware product, not including storage modules or software components, will be free from defects in materials and workmanship for a period of three years from the date of purchase. AJA Video warrants that the storage modules provided as part of the hardware product will be free from defects in materials and workmanship for a period of one year from the date of purchase. AJA Video provides a separate software warranty as part of the license agreement applicable to software components.

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- Replace the product with a direct replacement or with a product that performs substantially the same function as the original product.
- Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

To obtain service under this warranty, the Customer must notify AJA Video of the defect before expiration of the warranty period and make suitable arrangements for the performance of service by contacting AJA Video support through the channels set forth on the support contacts web page at <https://www.aja.com/support>.

Except as stated, the Customer shall bear all shipping, packing, insurance and other costs, excluding parts and labor, to effectuate repair. Customer shall pack and ship the defective product to a service center designated by AJA Video, with shipping charges prepaid. AJA Video shall pay to return the product to Customer, but only if to a location within the country in which the AJA Video service center is located. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES OR LIMITATIONS ON APPLICABLE STATUTORY RIGHTS OF A CONSUMER, SO SOME OR ALL OF THE TERMS OF THIS PARAGRAPH MAY NOT APPLY TO YOU.

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