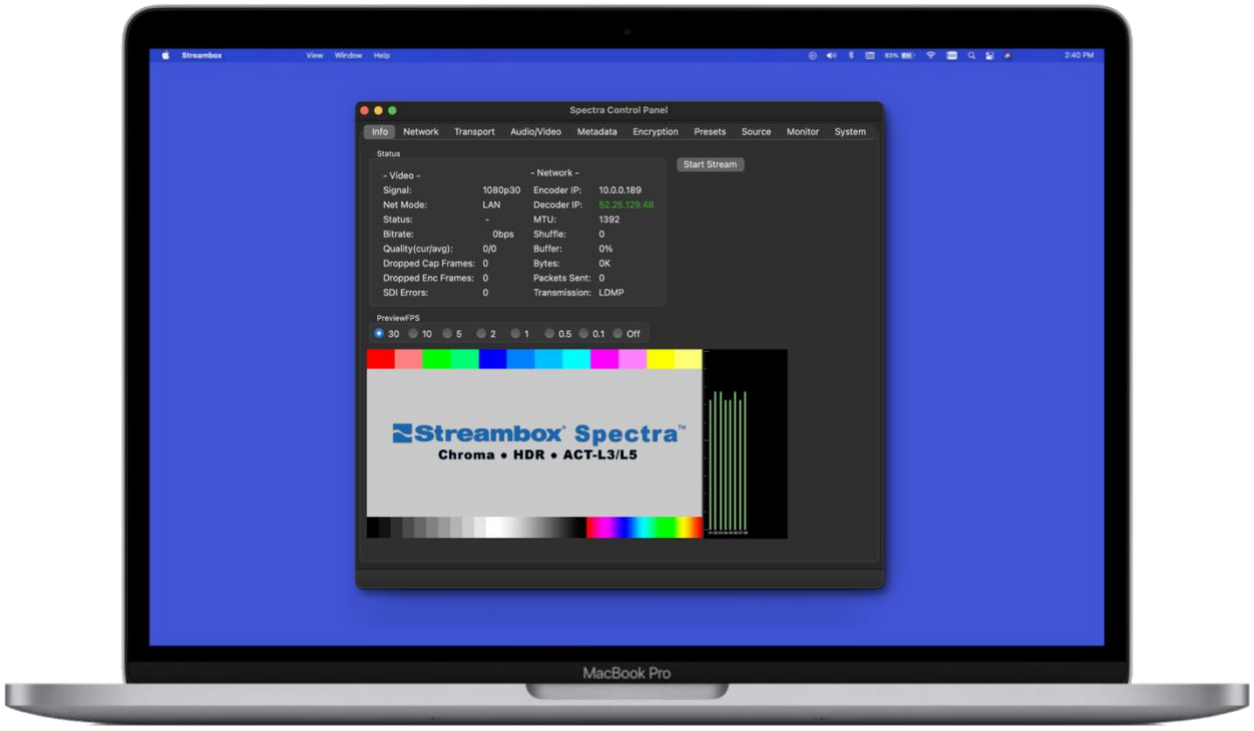
# Streambox® Spectra™




## Setup Guide (macOS)

Note: This document reflects the current feature-set which may change without notice (April 2023, U2a). We will attempt to keep all users up to date on any changes. Audio setup for Adobe After Effects have been added.

## Contents

# Introduction

Streambox Spectra is a software media encoder. Using Spectra, an editor or colorist can deliver real-time, high-quality video for review to Streambox devices anywhere in the world via private or public networks. Spectra plus Streambox Cloud Services provides one-to-many global connectivity with no compromise in quality, effectively creating multiple virtual screening rooms.

# Prerequisites

- Any 64-bit macOS device (M1 or Intel, Mojave, Catalina, Big Sur, Monterey, or later)

# Installation

1. Download Spectra for macOS installer

2. Open ‘Streambox Spectra for macOS...pkg’ file and step through the installation process.

3. After installation is complete, you can find SpectraControlPanel.app in the Application folder of the Finder

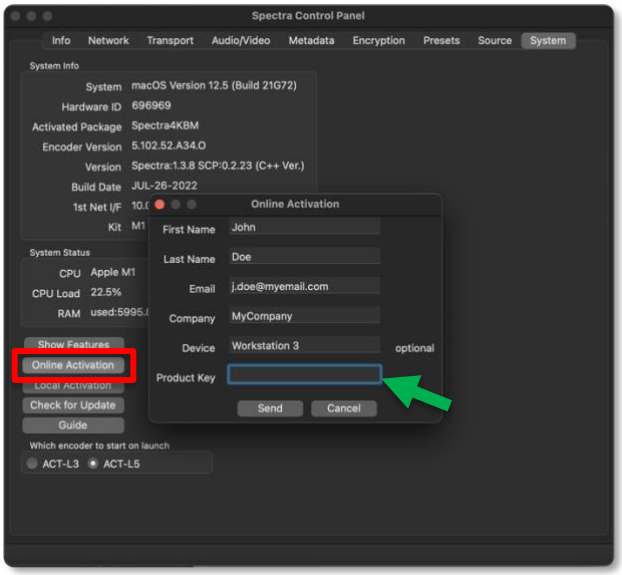
## Activation

There are two methods to activate Spectra and additional features under the System tab. Once activated, you can click ‘Show Features’ to see what features were activated. The following activations are currently available: HD, 2K, and UHD/4K Bundles (Avid, Adobe, Blackmagic), and the following ad-on options: 4:4:4, Dolby Vision, 16-Channel Audio, and AES Encryption (128 and 256).

1. ***Online Activation*** requires a Volume License and the Spectra installation has internet connection.

   *Note 1: You may skip this step if Spectra is already activated*

   - Obtain Activation Code/Serial Number from your system administrator (this can be setup through Streambox Sales or Support).
   - Fill-in user information
   - Enter each applicable Activation/Serial code (green arrow), one at a time, and click ‘Apply’ for each.

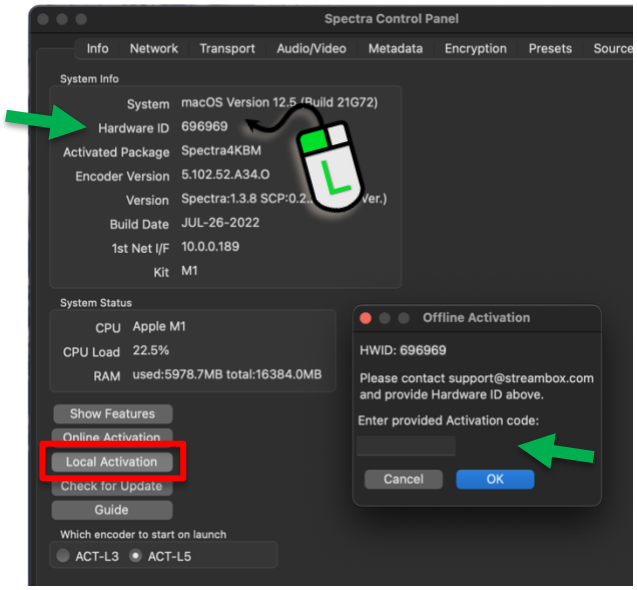



*Note 2: You may click the ‘Show Features’ button to see what has been activated.*

2. ***Local (Offline) Activation*** supports single activation for each instance of Spectra.

   *Note 1: You may skip this step if Spectra is already activated*

   - Obtain Hardware ID: open 'System' tab (look under System Info, click to copy to clipboard)
   - Email Hardware ID to:
     support@streambox.com
   - Please ask to activate as:
     _ 4K or HD and
     _ Blackmagic, Avid, or Adobe and
     _ AES 128-bit or AES 256-bit[1]
   - Click Local Activation, then enter each Activation Code (green arrow) and 'Apply' separately




*Note 2: You may click the 'Show Features' button to see what has been activated*

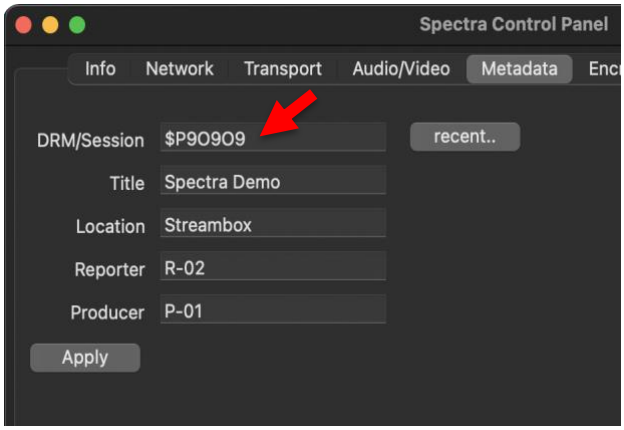
## Check for Updates and open User Guide

From the System tab you can check for updates; click the 'Check for Update' button. Click the Guide button to open the Quick Start Guide.

# Changing Session DRM

Spectra utilizes Streambox Sessions to simplify connectivity between the primary user (host) and any number of end users (reviewers). You will need to set up a Session, Set the Session DRM (under the Metadata tab), and set the Destination IP (under the Network tab):

1. Setup or choose a current Session (remember, only one encoder can stream to an individual Session at a time). If you are not familiar with Streambox Sessions, please refer to [Streambox.com Resources] for guides and videos.



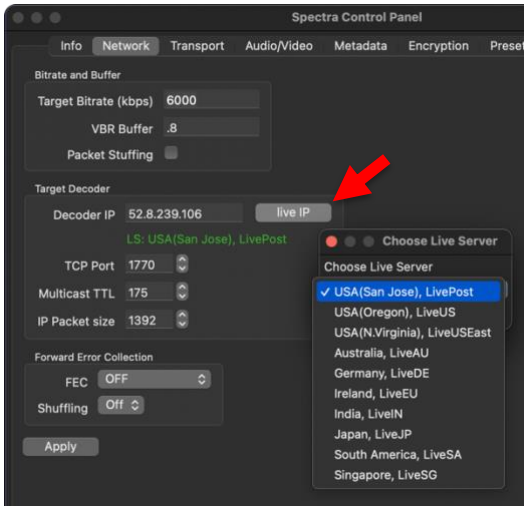

[1] Additional requirements and fees are associated with AES 256-bit encryption

2. Enter the Session DRM.
   Under the 'Metadata' tab, enter the DRM/SESSION (red arrow) and make sure to 'Apply' any changes made.

   *The other values in Metadata are optional but are good practice and should help to identify the stream*

Note 1: Always remember to 'Apply' any changes to this page.

3. In most cases, the correct Destination IP will be set if a Session DRM is entered under the Metadata tab. If you need to change the Destination IP, select the Target Decoder (Destination IP) under the **Network** tab to match the Session DRM prefix ($_). Use the table below to match the Session DRM prefix ($ plus next character). For example, in the image above, the sample Session DRM is $P90909, so from the table below you see that the Live Server is "LivePost (San Jose)". You can click the 'live IP' button to select this server (red arrow, or manually enter the IP address).




| Name | Public IP Address | Session Prefix | Location |
|---|---|---|---|
| Live**US**.streambox.com | **52.25.129.48** | **$A** | USA (Oregon) |
| Live**USEast**.streambox.com | **54.83.19.155** | **$B** | USA (Northern Virginia) |
| Live**AU**.streambox.com | **52.62.2.246** | **$C** | Asia Pacific (Sydney) |
| Live**DE**.streambox.com | **54.93.179.19** | **$E** | Europe (Frankfurt) |
| Live**EU**.streambox.com | **54.247.100.52** | **$F** | Europe (Ireland) |
| Live**JP**.streambox.com | **52.69.71.156** | **$G** | Asia Pacific (Tokyo) |
| Live**SA**.streambox.com | **54.233.86.10** | **$H** | South America (Sao Paulo) |
| Live**SG**.streambox.com | **52.76.243.157** | **$I** | Asia Pacific (Singapore) |
| Live**IN**.streambox.com | **52.66.83.26** | **$J** | India (Mumbai) |
| Live**Post**.streambox.com | **52.8.239.106** | **$P** | USA (San Jose, California) |

Source: https://www.streambox.com/knowledgebase/streambox-cloud-server-ip-addresses

# Using the Spectra Control Panel

Start SpectraControlPanel from the LaunchPad. For easy access, we recommend that you select ‘Keep in Doc’ from the Options group (right-click icon in dock, select ‘Options’, then select ‘Keep in Dock’).


## Stream Settings

There are many parameters that can be used to fine-tune a video stream. In the descriptions below we provide sample settings that will usually work for simple HD streams. Below are links for those who want a more detailed review. Remember, if at first you don’t succeed, you can always contact Support.

Transport, LDMP:
https://www.streambox.com/knowledgebase/advanced-ldmp
Stream latency:
https://www.streambox.com/knowledgebase/guide-to-reducing-stream-latency-delay
Sessions:
https://www.streambox.com/knowledgebase/streambox-cloud-with-sessions-workflow-best-practices-part-1
https://www.streambox.com/knowledgebase/streambox-cloud-with-sessions-workflow-best-practices-part-2
https://www.streambox.com/knowledgebase/streambox-cloud-with-sessions-workflow-best-practices-part-3
https://www.streambox.com/knowledgebase/streambox-cloud-with-sessions-workflow-best-practices-part-4

## Selecting the Source Input

You first need to set the video input. Since Spectra poles the system when it loads, you will need to ensure that the source is open/available before you load Spectra. From the Source tab you select from the Capture Driver dropdown the input source: e.g., iSight, USB, Blackmagic, Spectra (for Avid Media Composer, Adobe Premiere Pro, and Blackmagic DaVinci Resolve), NDI, etc. Always remember to press ‘Apply’ if the Capture Driver is changed. If the source it available, you should see its output on preview panel under the Info tab.

# Info tab

The ‘Info’ tab provides the stream status, a ‘Start/Stop’ stream button, and a Preview panel.

You can preview a facsimile of what is being delivered to the Spectra Encoder by setting the ‘Preview FPS (frames per second)’ panel to a value other than Off.

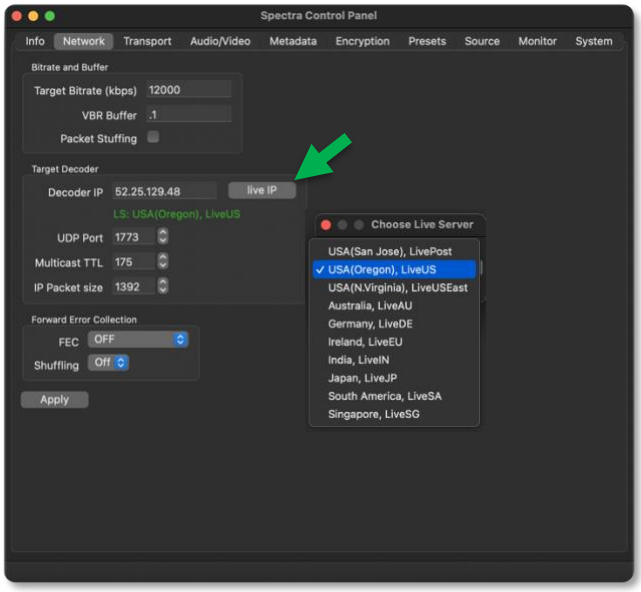

# Network tab

The Network tab is where you set the target bitrate, buffer size, and target decoder settings.

You can enter a specific (private) Decoder IP or you can select from one of Streambox’s AWS Live servers (green arrow).

Note 1: The Target Decoder IP must match the Server where the Session was created. See Changing Session DRM above.

Note 2: The other values here are good starting points for HD (you can always increase the Target Bitrate if your network supports that upload rate). Rates up to 100 Mbps (100000) have been tested for UHD, 10-bit streams.

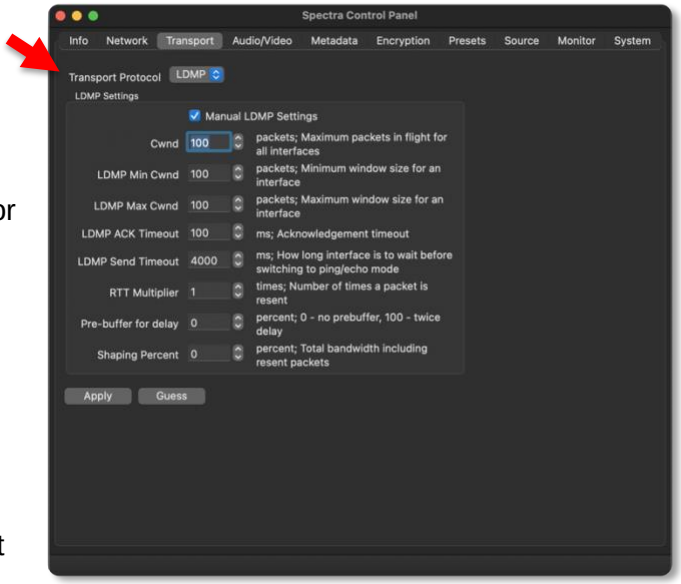



Note 3: Remember, if you are struggling to set up Spectra, Streambox Support is happy help.

Note 4: Always remember to ‘Apply’ any changes to this page.

# Transport tab

The Transport tab is where you set the LDMP/UDP settings. If you are not familiar with these settings, please refer to the Advanced LDMP article.




The settings shown here are a good starting point for an HD stream.

For lower latency, you can try:
If good network connectivity, < 12Mbps:
100, 100, 100, 150, 1000, 2, 10, 100
If excellent network connectivity, <12Mbps:
50, 50, 50, 150, 1000, 2, 10, 0

Note 1: If you require fine tuning, feel free to contact Streambox Support.

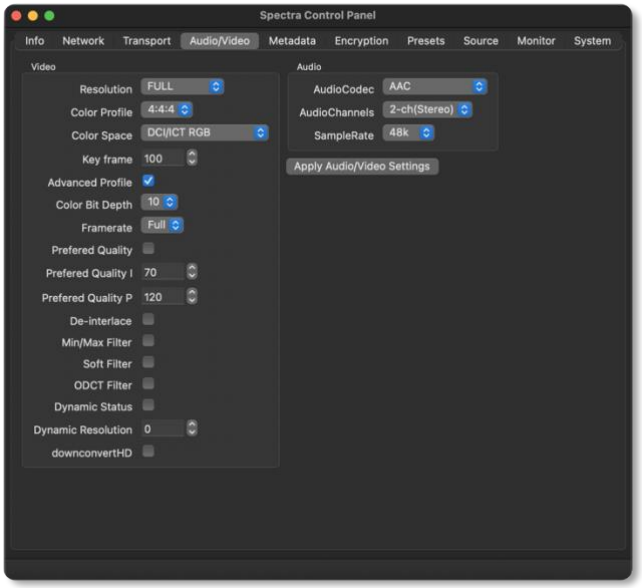
Note 2: Always remember to ‘Apply’ any changes to this page.

# Audio/Video tab

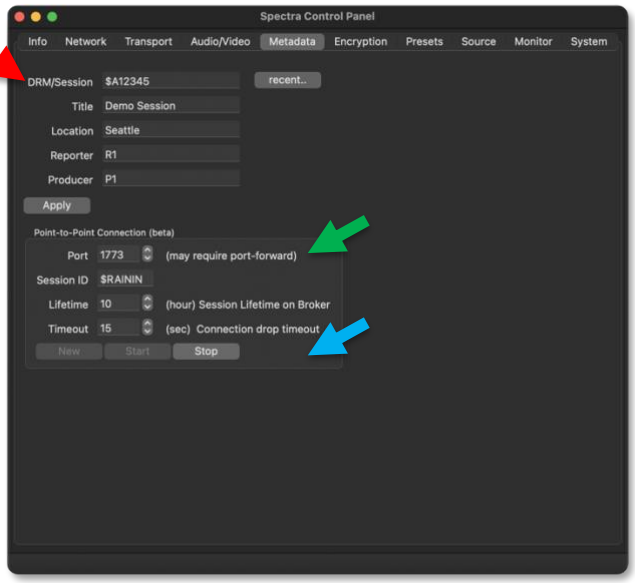
The Audio/Video tab is where the properties of the video stream are defined, e.g., Resolution, Color Profile, Audio Codec, Audio Channels, etc.

Note 1: PCM audio codec improves (lowers) latency by several frames.

Note 2: Always remember to ‘Apply’ any changes to this page.



# Metadata Tab (Session & P2P)




The Metadata tab provides two Session styles: 1. Streaming to Streambox Cloud for distribution, 2. Streaming point-to-point to a specific decoder/player – like a reference monitor.

1. Once a Session is created on one of the Streambox Servers, enter its DRM here (red arrow) and provide the Session ID to the remote viewers. For best practice, fill in the Title, Location, Reporter, and Producer fields.

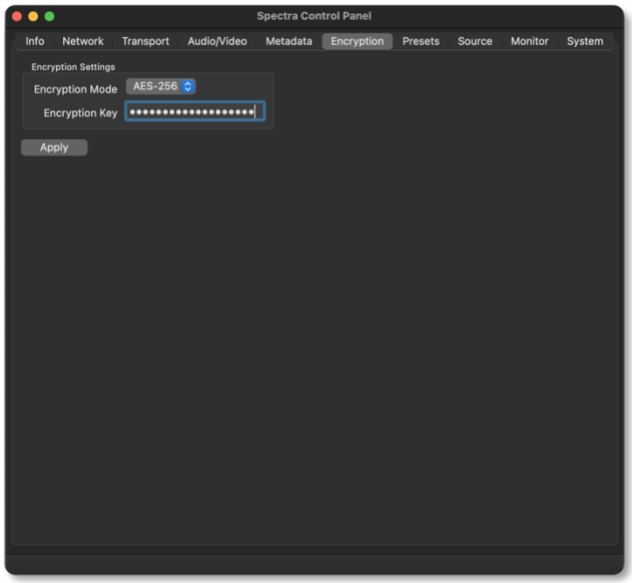
   Click 'Apply' with any changes.

2. For Point-to-Point (P2P), you must first setup the desired Port. Pick a Port to use (green arrow; 1770-1800 are usually safe). On the network router set up Port-Forwarding for the devices internal IP (found on the Info tab, "Encoder IP"). This only needs to be done once (unless the device is moved to a new router zone).

   Click on the 'New' button (blue arrow, if Stop is highlighted, click that first). Now click the 'Session ID' to copy it to the Clipboard. You can now share the Session ID to be entered in the decoder/player for the point-to-point monitor.

   Once the point-to-point decoder/player initiates the Session ID, Spectra here will start to stream directly to it. To stop the stream, click Stop on the decoder/player.

# Encryption tab



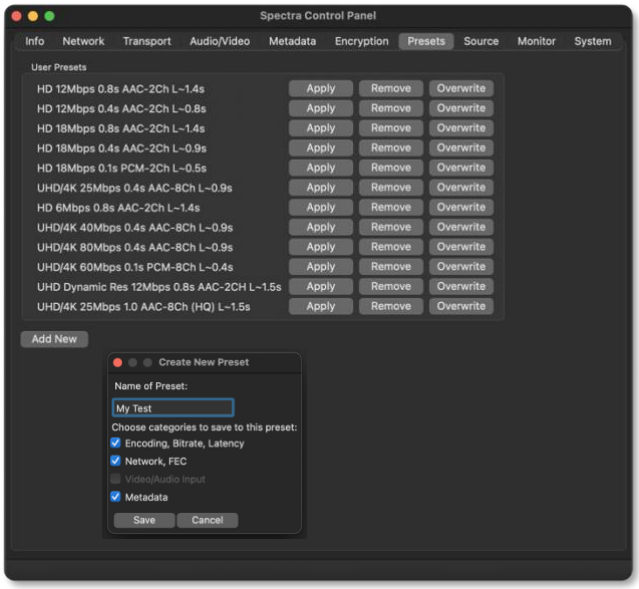

The Encryption tab is where the user can set the key and initiate encryption (AES 128-bit encryption is supported by default; AES 192-bit and 256-bit encryption requires additional activation with restrictions). If encryption is initiated, a matching key must be used on any decoder/player to display the stream.

Note 1: Encryption does not increase stream latency.

Note 2: When encryption is initiated the video is encrypted end-to-end; metadata is not encrypted.

# Preset tab

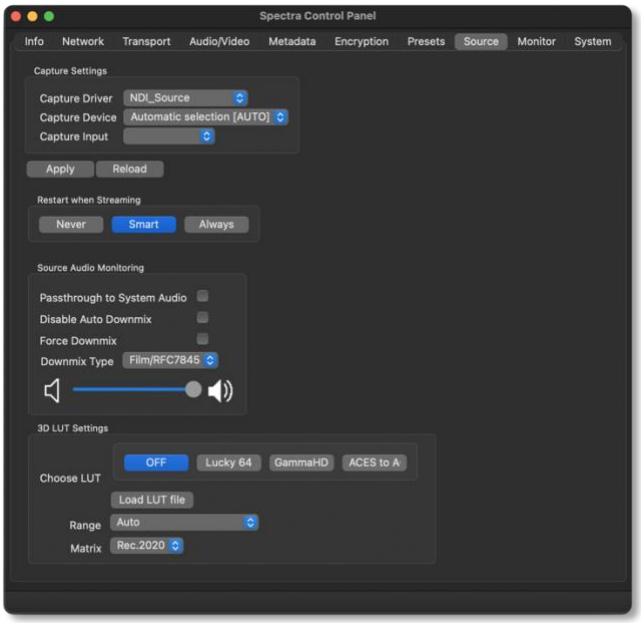
The Preset tab is where presets for Encoding, Bitrate, Latency, Network, FEC, Video, and Audio settings, and Metadata values can be defined. Click the associated Apply button to apply a defined preset. Or you can create a new preset by setting the values/properties you desire on the various tabs and then click the ‘Add New’ button to create a new preset or you can ‘Overwrite’ (update) a current preset.




Note 1: The Presets provided in this release may not be optimized for your system. Feel free to contact Support if you require assistance in optimizing these presets.

# Source tab

The Source tab sports four features: Capture Settings, Restart when streaming, Audio Monitoring, and 3D LUT Settings. First, make sure the source (media editor, NDI source, etc.) is open before you load Spectra (since Spectra poles available sources when it loads).




## Capture Settings

From the Capture Driver dropdown select the source, e.g., iSight, USB, Blackmagic, Spectra (for Avid Media Composer, Adobe Premiere Pro, and Blackmagic DaVinci Resolve), NDI, etc. Once you select the device, click ‘Reload’ to read the properties of that source. Then you can select the ‘Capture Device’ if more than one is supported. Additional settings like image resolution can be set from the ‘Capture Input’ dropdown. In most cases you will want to leave this as ‘AUTO’.

Note 1: Always remember to ‘Apply’ any changes to this page.

Note 2: With some devices, you will have to close and re-open Spectra for the changes to take place.

### NDI Tools

Since Spectra ingests NDI streams, you can take advantage of several of the NDI Tools and apps that output NDI to extend the Spectra workflow. For example, you could use NDI Scan Converter to stream your entire desktop or just an app – like the video editor you are using. You could also use NDI Test Patterns to generate test patterns for setup.

## Restart when Streaming

This option describes how the encoder will restart on video signal loss or change. It only has effect when encoder is streaming.

Never – If the signal is lost or has changed, the 'near option' will keep the last valid frame and wait for the original video feed (signal type when started, e.g., 1080p24) to be available again.
If other signal type is detected, 'Never' will ignore and treat as complete signal loss.

Smart – will not restart on signal loss, and will keep the last valid frame. It will, however, restart if a new "valid" video signal is detected (e.g., streaming started with 1080p24 and switched to 1080i5994 – Smart will switch to 1080i5994).

Always – will restart on any stream change like signal loss or new video signal.

## Source Audio Monitoring

Spectra supports audio passthrough so you can hear locally what you are streaming.[2] To hear the local timeline audio when Streambox Spectra is selected as your audio device (in Premiere or Resolve), check 'Passthrough to System Audio.' If you are working on a system with only two speakers and you are editing media with 3 to 16 audio channels, Spectra will automatically downmix the local audio. You can disable this by checking the 'Disable Auto Downmix.' Conversely, you can force a downmix on a system with multiple speakers (e.g., when using headphones). Lastly, you can select the Downmix Type that best suits your project.

## 3D LUT Settings

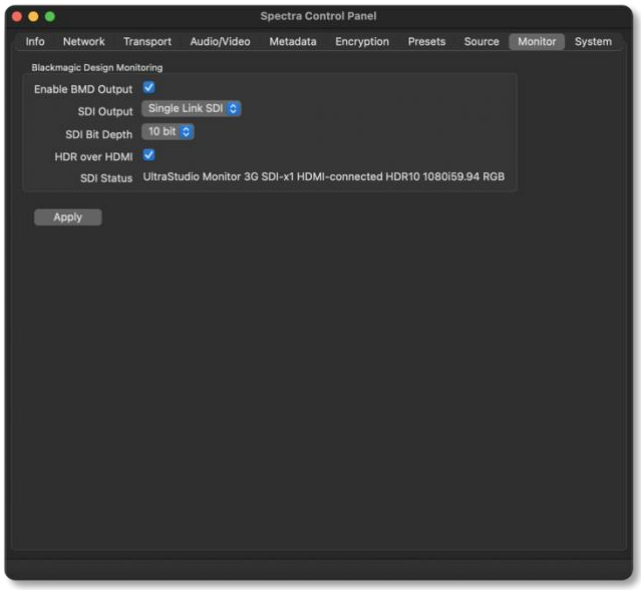
Spectra supports on-the-fly application of 3D LUTs. This can eliminate the need for an external LUTs device. Also, Streambox media players, decoders, and Sessions also support on-the-fly application of LUTs. This allows a unique review of the video, at every point of the workflow, from anywhere in the world.

Note: For more details and example workflows, see Appendix.

[2] For Adobe Premiere Pro and Blackmagic DaVinci Resolve (Avid Media Composer provides its own audio passthrough).

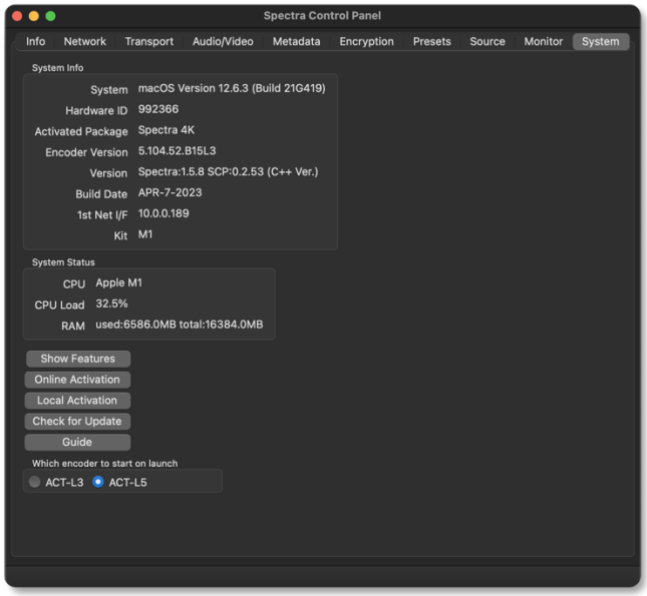
# Monitor tab

You can output a reference stream directly to a connected Blackmagic Design device. Chose the appropriate settings and click ‘Apply’. It is often helpful to have a connected reference monitor as well as streaming to remote reviewers. External speakers should be connected to the reference monitor so that video is in sync with audio (but not required).




# System tab

The System tab is where you go to find specific system and software information, where you can review activated features, or activate new features. You can also check for app updates and download a user’s guide. The System tab was also covered above under the Installation section above.



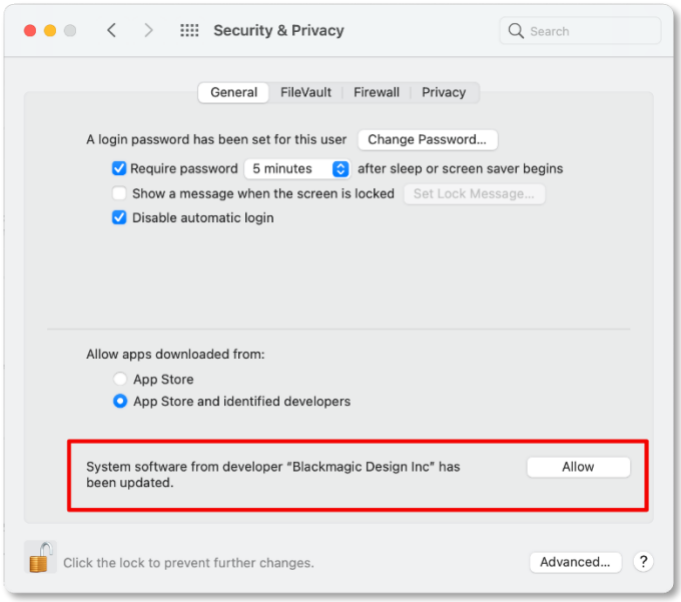

## ACT-L3 / ACT-L5 Switch

The ACT-L3 / ACT-L5 switch is located at the bottom of the System tab. ACT-L5 supports all ACT-L3 features plus HDR and 10 and 12-bit color. ACT-L5 is also a more efficient encoder though HDR and 10-bit require more bandwidth. Remember to restart Spectra when you change between ACT-L3 and ACT-L5.

# Appendix

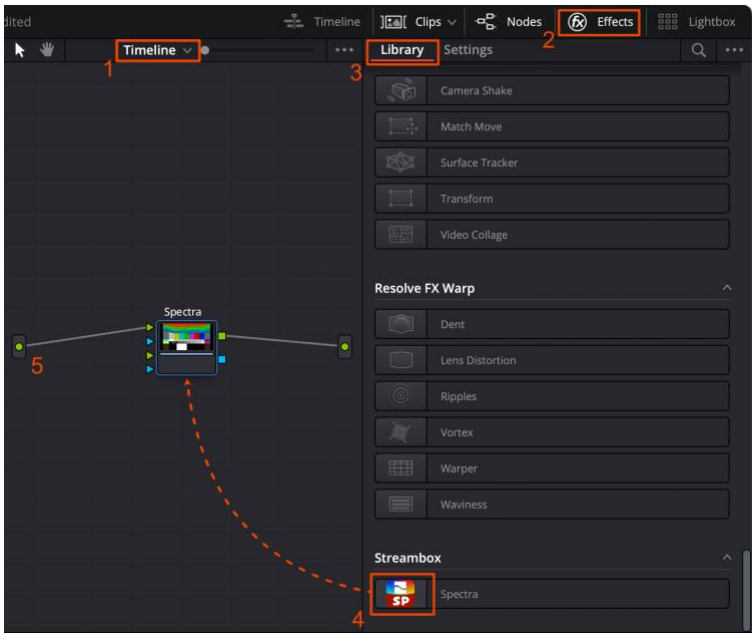
## Blackmagic *Desktop Video Setup* (Software Update)

If your macOS is Big Sur or later and you are using the Blackmagic Ultrastudio Mini Recorder you will have to update the Desktop Video Setup app version to 11.7 or above. For the installation to be complete, you need to open the Security & Privacy (System Preferences) and 'Allow' the new Blackmagic Design Inc software.




## Blackmagic DaVinci Resolve Setup

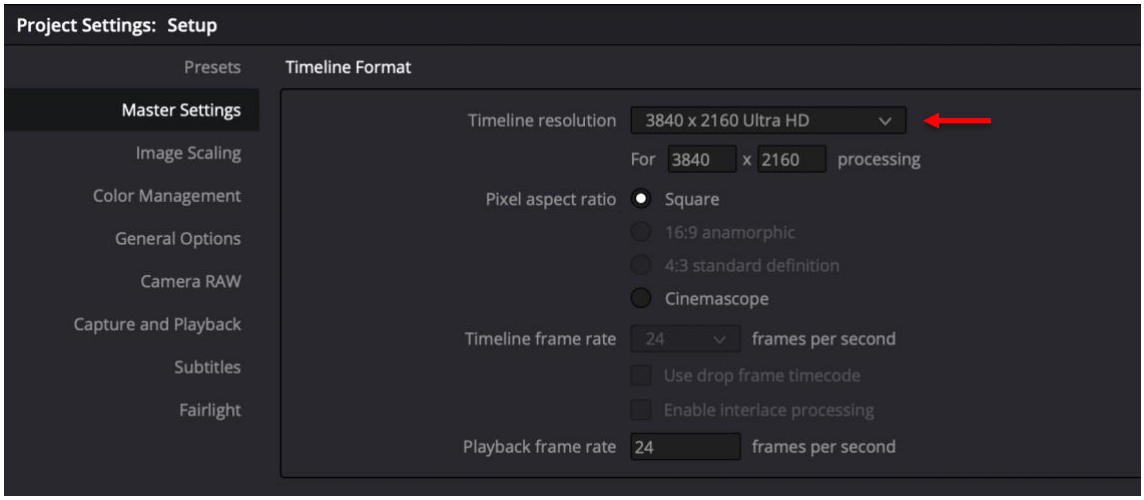
You must apply the Spectra node to the timeline: Under the 'Color' page 1) Switch the focus to Timeline, 2) Open the OpenFX panel, 3) Select the Library list, 4) find and drag the Spectra tool into the node field, and 5) Connect the Spectra node to timeline in and out.



Note: The OpenFX plugin is part of the Avid Media Composer installation and requires the "SpectraAVID" license, and if not activated reports that the "Spectra AVID license is missing."

## UHD/HD Setup

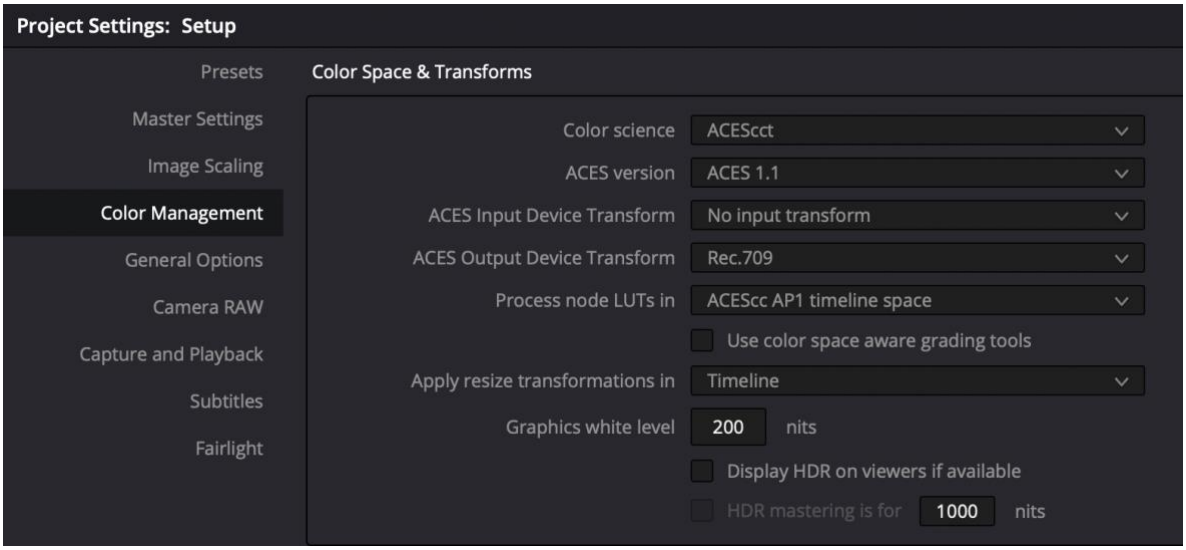
Spectra uses the timeline format, from the Project Settings page, as the output format (see image below). Set the 'Timeline resolution' to the appropriate resolution; Resolve will adjust the timeline scale accordingly.




## Using ACES or other expanded Colorspace

Academy Color Encoding System (ACES) is a standard developed under the auspices of the Academy of Motion Picture Arts and Sciences organization. To properly deploy ACES with Spectra requires a few extra steps.

1. Setup the 'Color Management' tab of the Project Settings page as follows…
   Note: Either ACEScc and ACEScct will work.

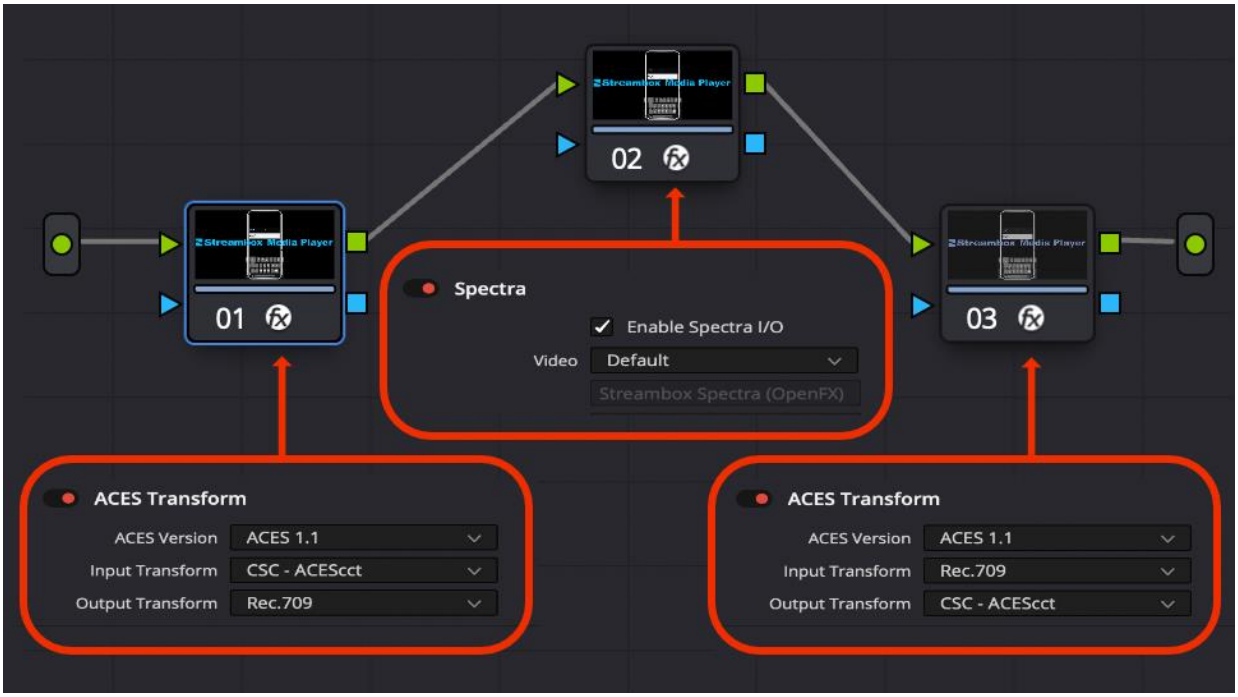



2. On the Color page, switch focus to Timeline (as described above) and add 3 Corrector nodes.

3. To the middle node (02), add Spectra from the OpenFX list (see image below).

4. To the first node (01), add ‘ACES Transform’ from the OpenFX list
    - Set the ACES Version to match the Color Management settings from the Project Settings page (e.g., ACES 1.1)
    - Set Input Transform to match your Color Management settings from the Project Settings page (e.g., ACEScct)
    - Set Output Transform to match your Color Management settings from the Project Settings page (e.g., Rec.709)

5. To the third node (03), add ‘ACES Transform’ from OpenFX list
    - Set the ACES Version to match the first node (01), e.g., ACES 1.1
    - Set Input Transform to match Output Transform of first node (01), e.g., Rec.709
    - Set Output Transform to match Input Transform of first node (01), e.g., ACEScct)




6. Once these changes have been made, you can do a simple scrub of the timeline to make sure Spectra is receiving a representative image.

Note: If you add additional corrective nodes, they should be placed before the Spectra node.

## Troubleshooting

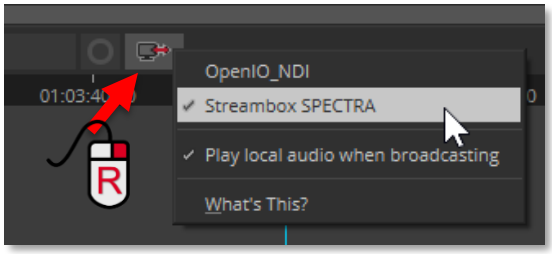
Background scrolling in Spectra: If Render Cache (in Playback Menu) is set to Smart you may see the image in Spectra scroll by as background rending takes place (during play or scrubbing). If this becomes an issue, you can set the Render Cache to User and then only render the cache when needed. Furthermore, you can set the Render Cache properties under the Manager Settings tab of the Project Settings dialog (from File menu).

OpenFX failure: If the Spectra OpenFX plugin initially fails, you may have to delete the OFXPluginCache.xml file. This file is located in the ~/Library/Application Support/Blackmagic Design/DaVinci Resolve folder.
From the Go menu of the Finder, select 'Go to Folder…' and enter the path above.

Note: Resolve defaults to 10-bit output so Spectra must be set to ACT-L5 (System page) and 10-bit Color Bit Depth on (Video/Audio page) for correct resolution to be displayed.

# Avid Media Composer Setup

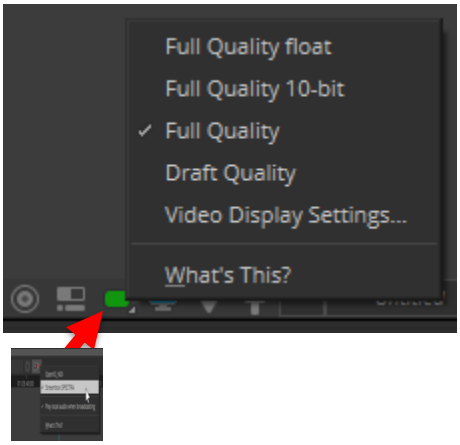
1. Set Avid output to ‘Streambox SPECTRA’ and ‘Play local audio…’ by right-clicking the ‘HW/SW’ switch (red arrow) located on the top margin of the timeline.




*Note: Left-clicking the HW/SW switch will turn the stream ON/OFF (make sure the double-headed arrow is displayed when you want to stream the output).*

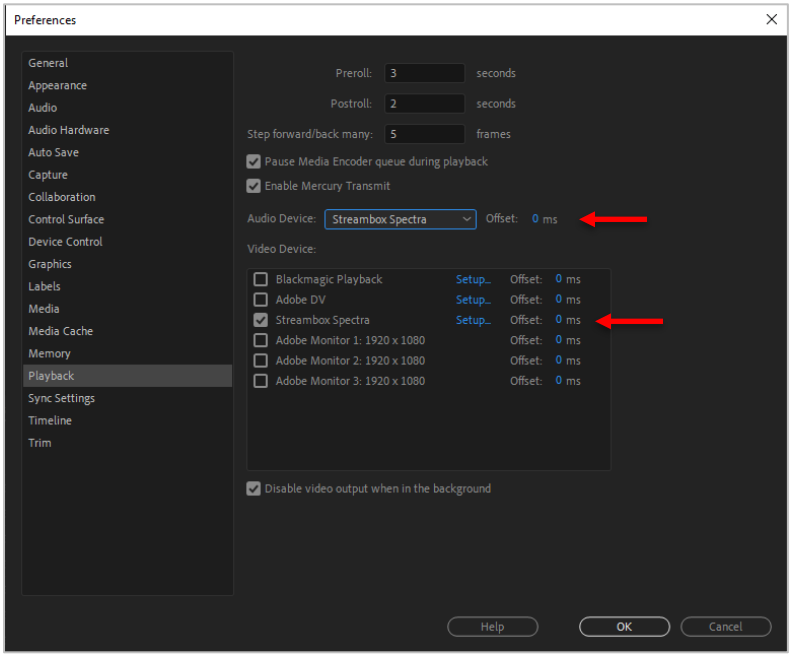
2. Set the output quality by right-clicking the ‘Video Quality Menu’ (lower left panel on timeline, red arrow). It must be **set to ‘Full Quality’ for Spectra to work correctly**.

   Note: If you are using the Spectra5 (ACT-L5) service and working on a 10-bit project, you will want to select ‘Full Quality 10-bit’. If you are working on a 12-bit project, use ‘Full Quality float’.



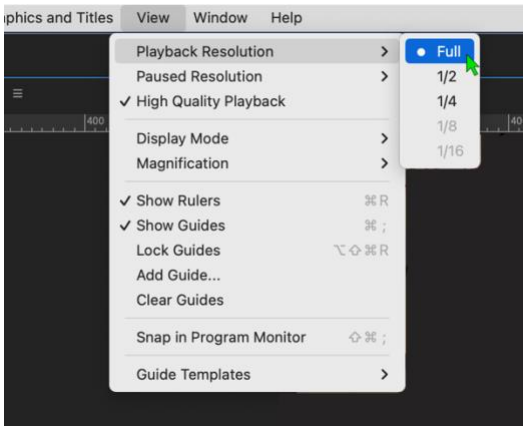

# Adobe Premiere Pro Setup

1. Set Premiere Playback ‘Audio Device’ and ‘Video Device’ to ‘Streambox Spectra’ from the Preferences panel under the Edit menu (see image, arrows).
   *Note: Setting Audio Device to Streambox Spectra sends all audio to the Spectra encoder; see Source Audio Monitoring under the Source tab section above.*



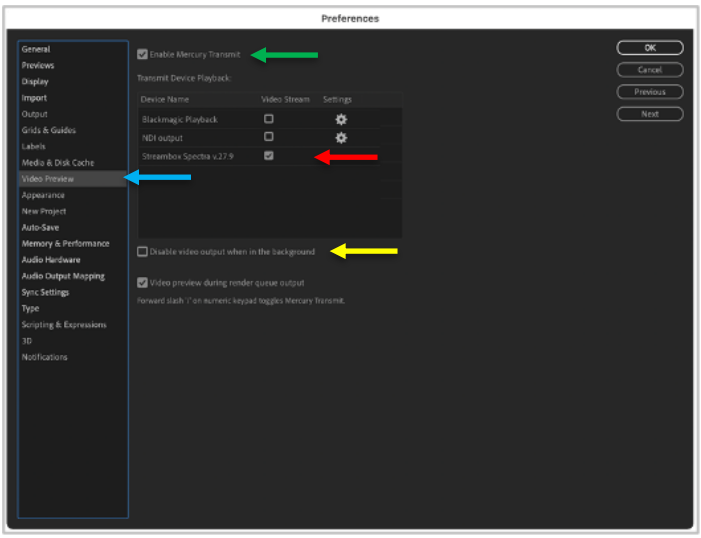

Note: Premiere Pro will change video format to match the video clip(s). Spectra can lock the format by selecting the desired format from the ‘Capture Input’ described above, Capture Settings.

2. From the View menu, set Playback Resolution to Full (image below). You can also select ‘High Quality Playback’.



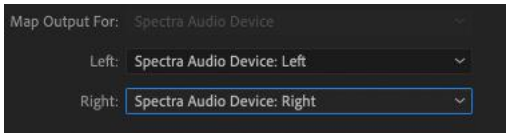

## Adobe After Effects, et al. Setup

You can use Spectra with Adobe After Effects, Character Animator, and Prelude. All are setup from the Preferences dialog.



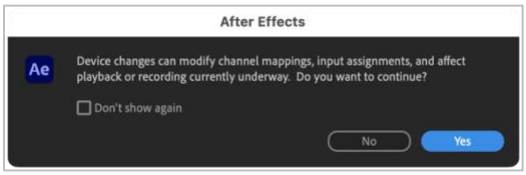

1. Under the ‘Video Preview’ tab (blue arrow):
   - Check ‘Enable Mercury Transmit’ (green arrow)
   - Check ‘Streambox Spectra’ under Device Name (red arrow).
   - Uncheck ‘Disable video…’ (yellow arrow)
   - Click ‘OK’.

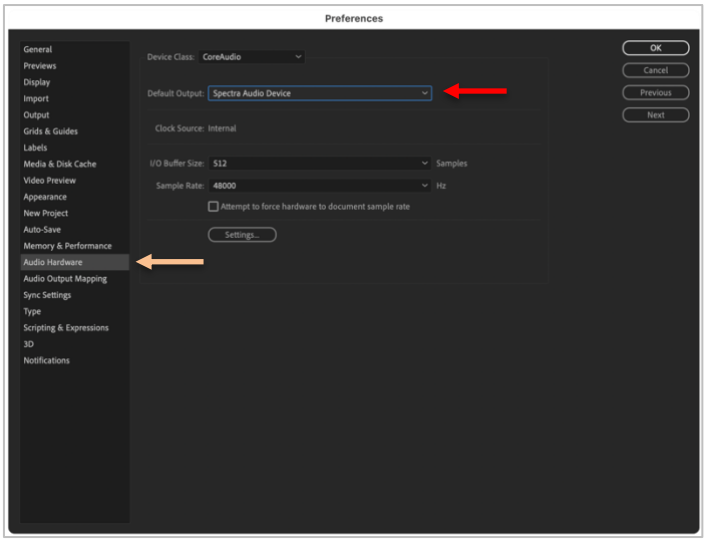
2. Under the ‘Audio Hardware’ tab (orange arrow):
   - Select ‘Spectra Audio Device’ for Default Output (red arrow)
   - Click ‘OK’.




Note 1. Mapping audio output, on the Audio Output Mapping tab, should have assigned each channel to the Spectra Audio Device.

Note 2. Since selecting Spectra can remap the audio channels, you may get the following warning – just accept by choosing ‘Yes’.



# Using 3D LUTs

Spectra supports on-the-fly application of 3D LUTs. This can eliminate the need for an external LUTs device. Also, Streambox media players, decoders, and Sessions also support on-the-fly application of LUTs. This allows a unique review of the video, at every point of the workflow, from anywhere in the world.

## Applying LUTs

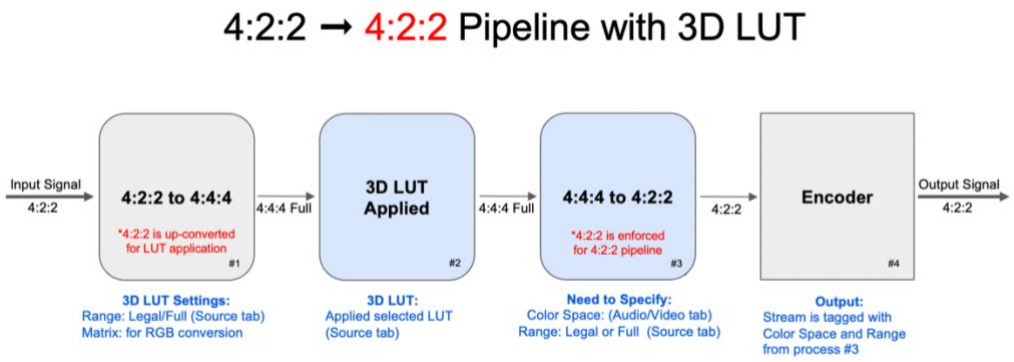
You can apply one of three selected LUTs which have been uploaded using the 'config LUT file' dialog (see Source tab section above). These LUTs should be of the standard 3D (cube) format.

## Color Profile

Under the Spectra Source tab (see Source tab section above), you need to specify the desired signal range (Full or Legal) and Color Space Matrix (Rec.601, Rec.709, or Rec.2020). Under the Spectra Audio/Video tab (see Video/Audio tab section above), you will need to specify the Color Profile (4:2:2 or 4:4:4) for the encoder output.

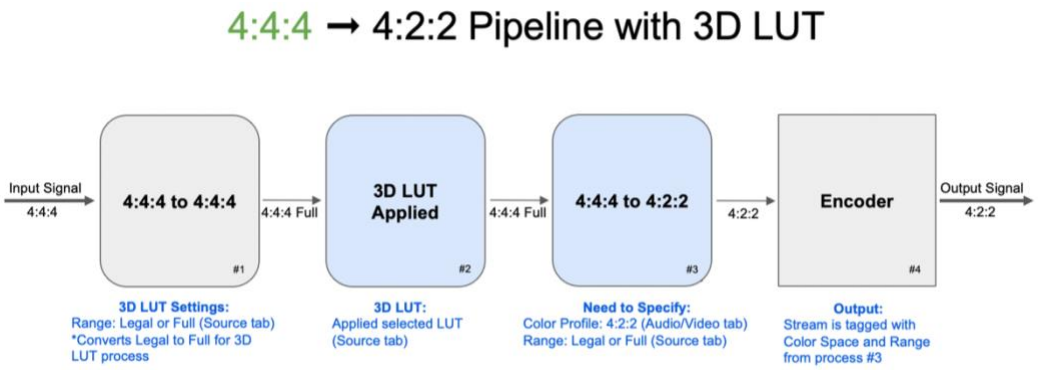
## LUT Application

Since 3D LUTs are always applied in RGB 4:4:4 Color Space, special care is required when working with a 4:2:2 signal or an RGB signal in Legal Range. That is, 4:2:2 or Legal Range signals are up-converted to 4:4:4, Full Range for 3D LUT application, and then down-converted for output.



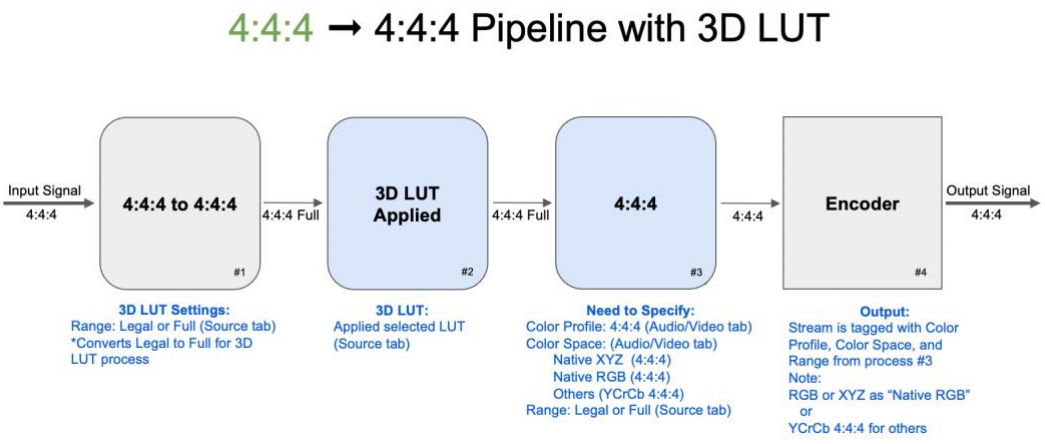

When Spectra applies 3D LUT to 4:2:2 signal it must convert YCrCb to RGB 4:4:4 first,

apply the LUT, then convert back to 4:2:2 where you can tag color space and convert to desired signal range.




For 4:4:4 Signal you only need to specify the signal range/levels before LUT. Then you can select either the 4:4:4 or 4:2:2 option for encoder input (Audio/Video Tab) and apply the appropriate Color Space and Range. If 4:4:4 is selected, the Native RGB, DCI/ICT, and XYZ options will use Full Range.

Please Note: Current implementation only allows 4:4:4 to 4:2:2 conversion on encoder input, in addition to 4:4:4 In/Out and 4:2:2 In/Out. 4:2:2 to 4:4:4 conversion is currently not supported on the Encoder side; that is, the output cannot be up-converted from 4:2:2 to 4:4:4.



## Sample Cases

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**Case 1: 4:2:2 to Rec.709 Legal (4:2:2)**
Example Input signal is 4:2:2, Rec.709 in Legal Range from Camera SDI

We want to apply 3D LUT and stream in Rec.709, Legal, 4:2:2 (e.g. to decoder connected to 4:2:2 SDI monitor)

In this case you will need to specify two options:

1 - On Source tab, under 3D LUT Settings, select the following to perform a correct YCrCb to RGB conversion:
select Range: **Legal Range**
select Matrix: **Rec.709**

2 - On Audio /Video tab, select the following to transform LUT output Stream to Rec.709 4:2:2 Legal and encode:
Color Profile: **4:2:2**
Color Space: **Rec.709 Legal**

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**Case 2: SDI Log, 4:2:2, Legal for ARRI camera to HDR, P3 D65 PQ, Full (4:2:2)**
Example Input signal is 4:2:2 ARRI LOG, using Rec.709 Matrix, and Legal Range.

We want to send signal to decoder connected to X300 in 4:2:2 HDR, P3 D65 PQ, Full

1 - On Source tab, under 3D LUT Settings, select the following to perform correct YCrCb to RGB conversion:
select Range: **Legal Range**
select Matrix: **Rec.709**

2 - On Audio /Video tab, select the following to transform LUT output stream to HDR P3 D65 PQ, Full and encode:
Color Profile: **4:2:2**
Color Space: **P3 D65 PQ Full**

---

**Case 3: ACES from "Spectra Plugin for Resolve" (4:4:4) to 4:4:4, Rec.2020 PQ, Full**

1 - On Source tab, under 3D LUT Settings, select the following:
select Range: **Full Range**
select Matrix: **Auto**
Note**:** Since signal from Spectra OFX arrives in RGB format, YCrCb to RGB Matrix is not used. Use appropriate 3D LUT for ACES to **Rec.2020 PQ**

2 - On Audio /Video tab, select following to transform LUT output stream to Rec.2020 PQ Legal and encode:
Color Profile: **4:4:4**
Color Space: **Rec.2020 PQ FULL**

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**Case 4: ACES from "Spectra Plugin for Resolve" (4:4:4) to 4:2:2, P3 D65 PQ, Legal**

1 - On Source tab, under 3D LUT Settings, select following:
select Range: **Full Range**
select Matrix: **Auto**
Note: Since signal from Spectra OFX arrives in RGB format, YCrCb to RGB Matrix is not used. Use appropriate 3D LUT for ACES to P3 D65 PQ

2 - On Audio /Video tab, select following to transform LUT output stream to P3 D65 PQ, Legal and encode:
Color Profile: **4:2:2**
Color Space: **P3 D65 PQ Full**

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