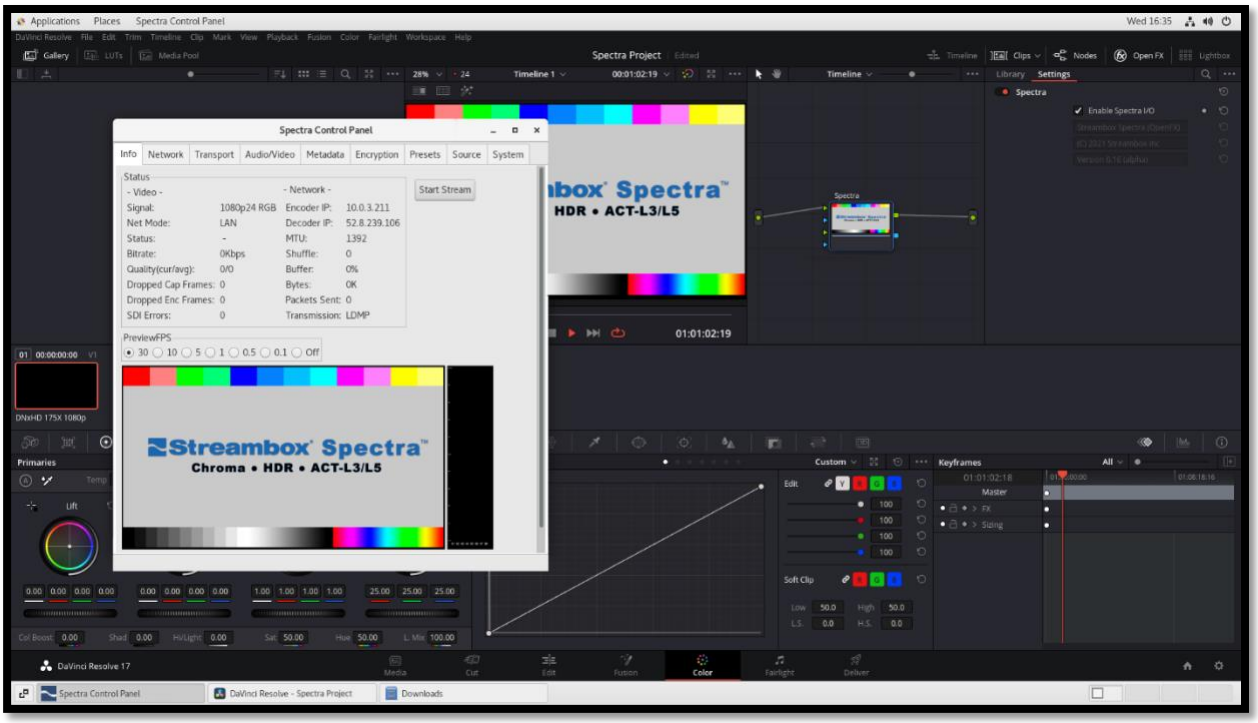
Streambox® Spectra™



Setup Guide – Spectra

AWS EC2 (Linux) – DaVinci Resolve

Note: This document reflects the current feature-set which may change without notice. We will attempt to keep all users up to date on any such changes. Updated: Jan 2022.

Contents

Introduction

Streambox Spectra[1] is a software media encoder that is ideal for the AWS[2]/DaVinci Resolve[3] workflow. Using Spectra, an editor or colorist can stream real-time, high-quality video for review to Streambox devices anywhere in the world. Spectra plus Streambox Cloud Services provides one-to-many global connectivity with no compromise in quality, effectively creating multiple virtual screening rooms.

Prerequisites

- AWS account (https://aws.amazon.com/marketplace/pp/prodview-zzy5tef4cq6sg)
- Davinci Resolve Studio License (https://www.blackmagicdesign.com/products/davinciresolve/)
- Streambox Spectra License (https://www.streambox.com/spectra/)
- Streambox Cloud account (sales@streambox.com) or sign up at https://live.streambox.com/ls/reg.html

Setup

Amazon Account

1. Use Amazon Web Services Marketplace to deploy Davinci Resolve ready to use image https://aws.amazon.com/marketplace/pp/prodview-zzy5tef4cq6sg

   Note: For HD, most virtual machines configurations will do. For 4K projects, we recommend g4dn.16xlarge instance type.

2. You will need to gain access to this AWS virtual machine. We recommend using NICE-DCV client (described below), but to gain access using this DCV client, you'll need to reset the password for user "centos" to some password of your choosing.

   In this example, the AWS host IP address is 123.45.67.89, with username centos, password MyPassw0rd, and the security keypair is named EC2keypair.pem. Run the following commands to change the account password, swapping in your preferred password, keypair name, and server IP:

[1] By Streambox Inc. https://www.streambox.com/introducing-spectra/
[2] By Amazon Web Services, Inc. https://aws.amazon.com
[3] By Blackmagic Design Pty. Ltd. https://www.blackmagicdesign.com/products/davinciresolve/

```
ssh -i ~/.ssh/EC2keypair.pem centos@123.45.67.89

sudo -Hi

set +o history

echo 'centos:MyPassw0rd' | chpasswd

set -o history

exit
```

NICE-DCV Client

3. Download and install NICE-DCV Client (for your OS):
   https://download.nice-dcv.com/

   Additional information, including security considerations on Setting up DaVinci Resolve with NICE DCV on AWS:
   https://resolve17marketplaceassets.s3.us-west-2.amazonaws.com/DaVinci+Resolve+AWS+Setup+Guide.pdf

   Information on Enabling USB Remotization. NICE-DCV supports a variety of remote (from desktop to AWS instance) USB devices via USB remotization.
   https://docs.aws.amazon.com/dcv/latest/adminguide/manage-usb-remote.html

Activate DaVinci Resolve

4. Activate DaVinci Resolve once your AWS instance is launched. Once activated, start DaVinci Resolve once to ensure all is properly initiated/setup.

   Note: We recommend using the latest release of DaVinci Resolve (17.4.2 or later)

   Concepts on creating a feature film with DaVinci Resolve on AWS:
   https://aws.amazon.com/blogs/media/creating-a-feature-film-with-davinci-resolve-on-aws/

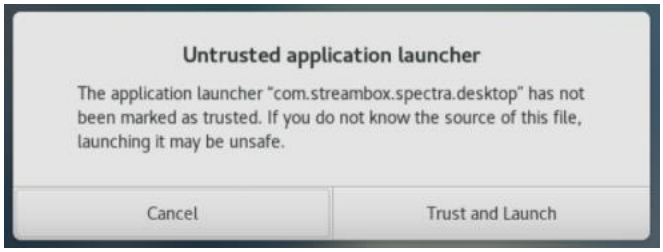
Install Spectra

5. Installation procedure:

   Run the following commands, in a terminal/console window, in sequence to download and run the Spectra installer.

```
cd ~/Downloads

curl -sSLO https://streambox-spectra.s3-us-west-
2.amazonaws.com/latest/linux/spectra.zip

unzip spectra.zip

cd spectra

bash ./install
```

After installation, double-click the 'com.streambox.spectra.desktop' icon on the desktop. You will then be prompted to trust this application. Click 'Trust and Launch'.



The icon will then change to standard Streambox Spectra icon and future launches will not require the Trust dialog.

Note: The installation target location is /opt/Spectra/

Note: You can also start Spectra from the Applications / Sound & Video menu (upper left of desktop).

Using Spectra

Activate Spectra

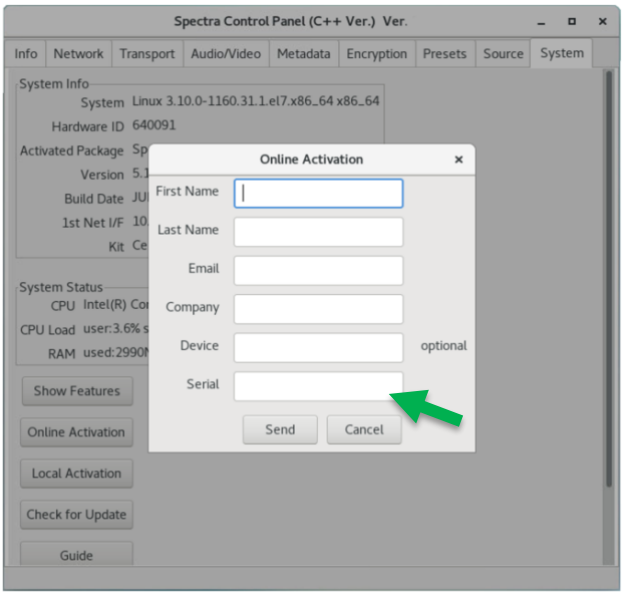
For Spectra on AWS, use the online activation method, which requires a 7-digit Product Key issued by Streambox Sales or Support. Once activated, you can click 'Show Features' to see what features were activated. The following activations are currently available: HD, 2K, and UHD/4K Bundles[4], and the following add-on options: 4:4:4/12-bit, and AES Encryption (128 and 256).

[4] The OpenFX plugin for DaVinci Resolve and Avid Media Composer are covered by the same "SpectraAVID" license/activation, and if not activated, reports that the "Spectra AVID license is missing."

1. ***Online Activation*** requires a Volume License.[5]

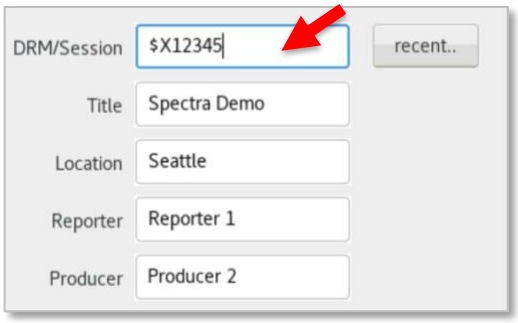
   - Obtain Product Key/Serial Number from your system administrator (this can be setup through Streambox Sales or Support).
   - Select the System tab and Click the Online Activation button to open the Online Activation dialog
   - Fill-in user information
   - Enter each applicable 7-digit Product Key code into the "Serial" field (green arrow), one at a time, and click 'Send' for each.

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



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, apply the Session DRM (under the Metadata tab), and apply the Destination IP (under the Network tab):



1. Create a session on the Streambox Cloud, or choose an existing, active 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 the Sessions Setup Guide.

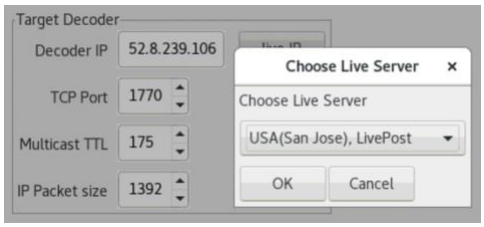
2. Enter the Session DRM.
   Under the 'Metadata' tab, enter the DRM/Session (red arrow) and make sure to 'Apply' any changes made.

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

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

[5] The OpenFX plugin for DaVinci Resolve and Avid Media Composer are covered by the same "SpectraAVID" license/activation, and if not activated, reports that the "Spectra AVID license is missing."

3. In most cases, the correct Destination IP will be set automatically if a Session DRM is entered under the Metadata tab. If you need to change the Destination IP, select the Target Decoder (Decoder 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, if the Session DRM is $P00000, from the table below you see that the Live Server is “LivePost”. You can click the ‘live IP’ button to select this server (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	$D	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 (California)

Reference: http://knowledge.streambox.com/knowledgebase/streambox-cloud-server-ip-addresses

Using the Spectra Control Panel

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.

See Video Tutorials:

https://www.streambox.com/resources/

Transport / LDMP:

http://knowledge.streambox.com/knowledgebase/advanced-ldmp

Stream Latency:

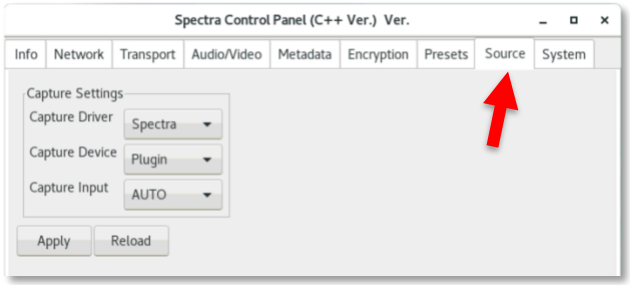
https://s3.us-west-2.amazonaws.com/streambox.support/Collected%20Manuals/Spectra/Streambox%20Guide%20for%20Reducing%20Stream%20Latency%20%28Delay%29.pdf

Sessions:

http://knowledge.streambox.com/knowledgebase/streambox-cloud-with-sessions-workflow-best-practices-part-1
http://knowledge.streambox.com/knowledgebase/streambox-cloud-with-sessions-workflow-best-practices-part-2
http://knowledge.streambox.com/knowledgebase/streambox-cloud-with-sessions-workflow-best-practices-part-3
http://knowledge.streambox.com/knowledgebase/streambox-cloud-with-sessions-workflow-best-practices-part-4-media-player-setup

Source tab

Select the video capture input from the Source tab (red arrow). First, make sure DaVinci Resolve is open before you load Spectra. From the Capture Driver dropdown select Spectra (if it is not already selected).

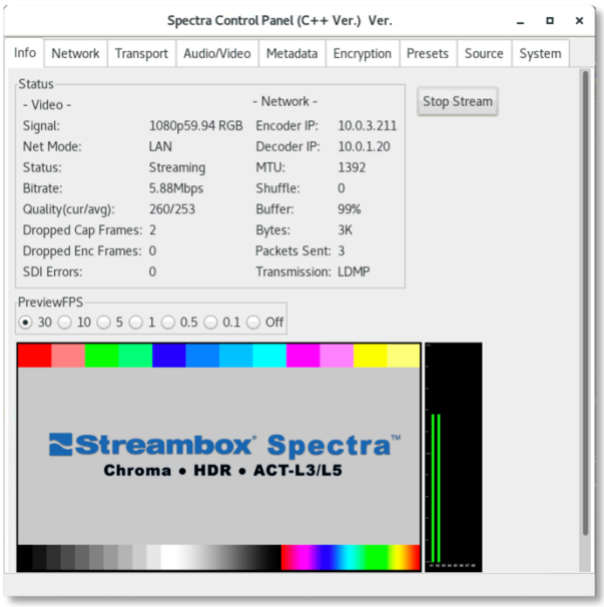


Note 1: Always remember to 'Apply' any changes to this page.

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

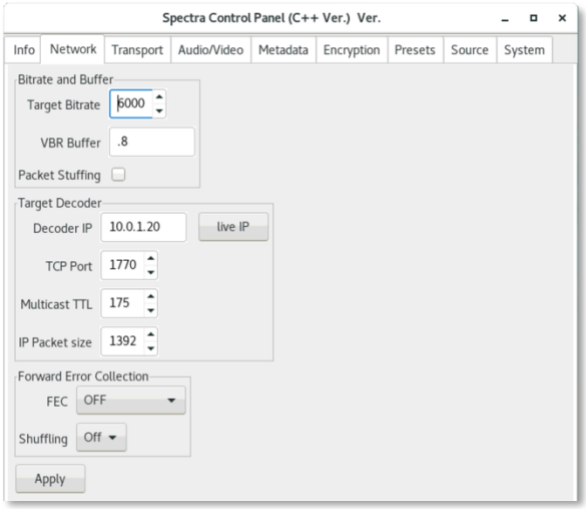
The Network tab is where you set the target bitrate, buffer size, and target decoder settings.

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. Rates up to 80 Mbps (81920kbps) have been tested for UHD, 10-bit streams.

Note 3: Remember, if you are struggling to set up Spectra, Streambox Support (support@streambox.com) is happy to 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 below are a good starting point for an HD stream.

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 latency by several frames as it is uncompressed audio. However, the bitrate requirement is up to 1.38 Mbps per audio channel.

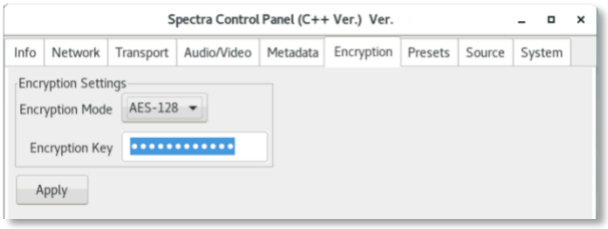
Note 2: Always remember to 'Apply' any changes to this page.

Metadata Tab

The Metadata tab was covered above under Changing Session DRM.

Encryption tab

The Encryption tab is where the user can set the encryption 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.



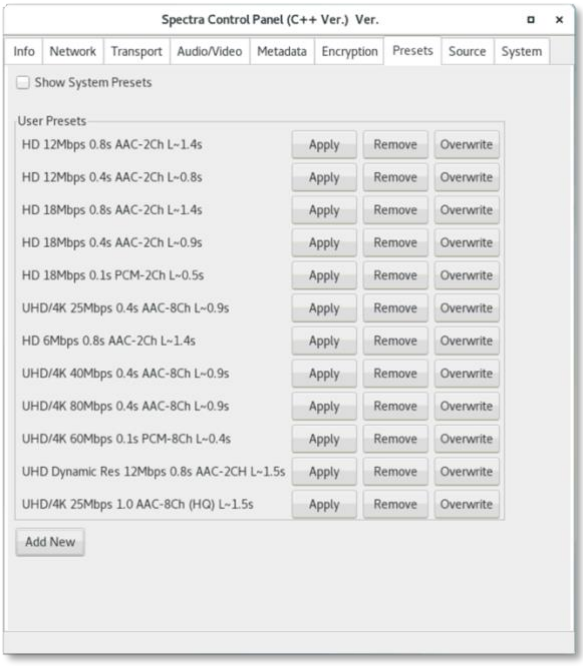
Note 1: Encryption Keys should use upper- and lower-case letters and numbers, and have a minimum requirement of 9 characters.

Note 2: Encryption does not increase stream latency.

Note 3: When encryption is initiated, the video is encrypted end-to-end; metadata is not encrypted.

Preset tab

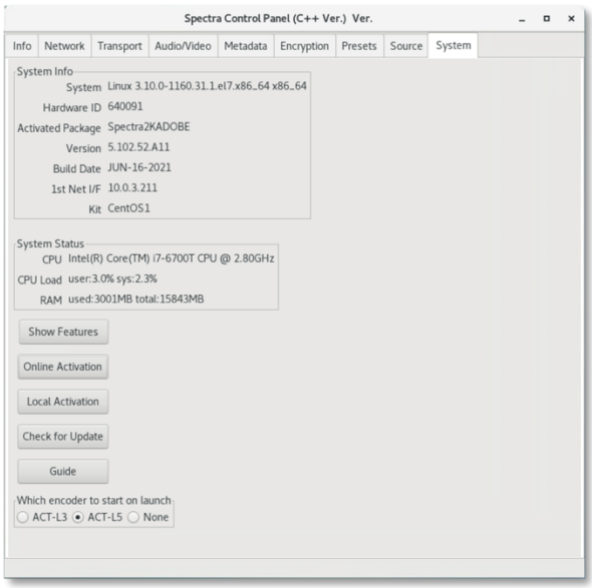
The Preset tab is where presets for Encoding, Bitrate, Latency, Network, FEC, Video, Audio settings, and Metadata values can be defined. Set the values/properties you desire on the various tabs and then click ‘Add New User Preset’ to create a new preset or ‘Overwrite’ to replace a current preset. Click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



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

System tab

The System tab is where you do the bookkeeping.



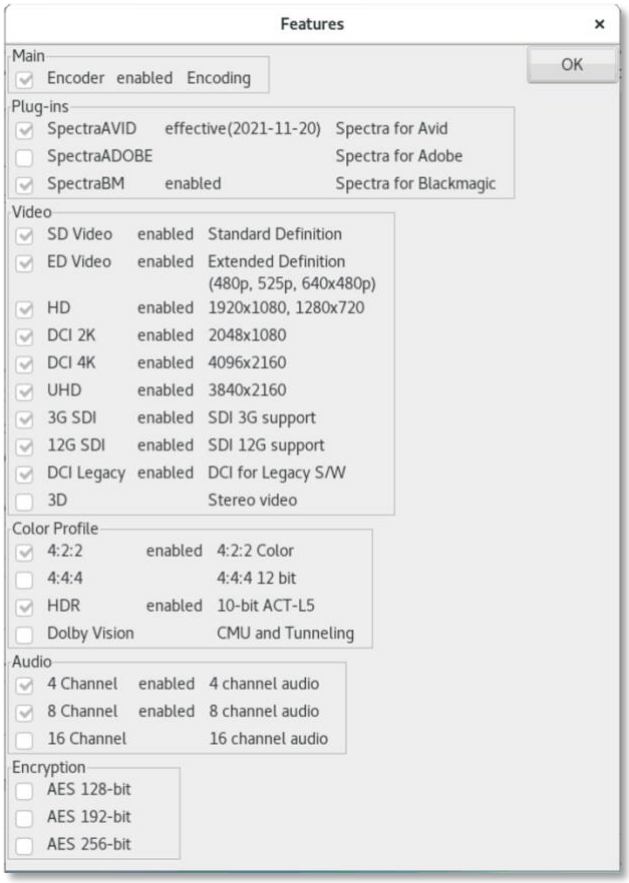
- You can review what features have been activated – the Show Features button opens the Features page (see image, following page). The Features page shows which features have been activated, and when they expire if they were purchased for a limited use period.

- Use ‘Check for Update’ to update Spectra with the latest release.

- Use the Guide button to open the Quick Setup Guide

- The ACT-L3 / ACT-L5 switch is located at the bottom of the System page. 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. ACT-L3 supports legacy Streambox Media Players and Decoders.

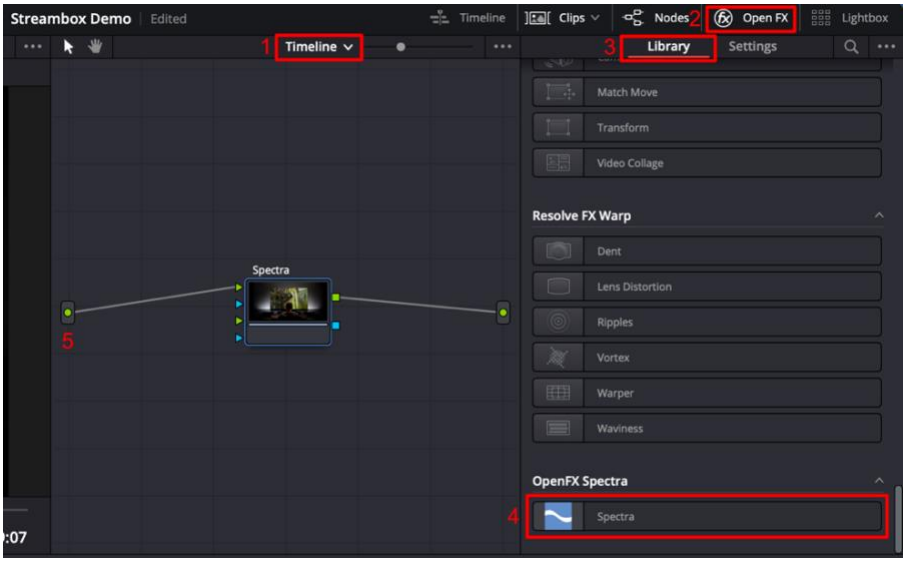
  Note: Remember to restart Spectra when you change between ACT-L3 and ACT-L5.

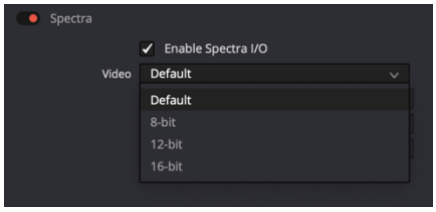


DaVinci Resolve Setup - Spectra

Spectra is the Streambox software encoder. Please refer to the Spectra Setup Guide for further information on using Spectra. You stream the timeline in Resolve to Spectra via an OpenFX tool (node).

The Spectra OpenFX node is setup as follows: In Resolve, 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 node into the node field, and 5) Connect the Spectra node to timeline in and out.





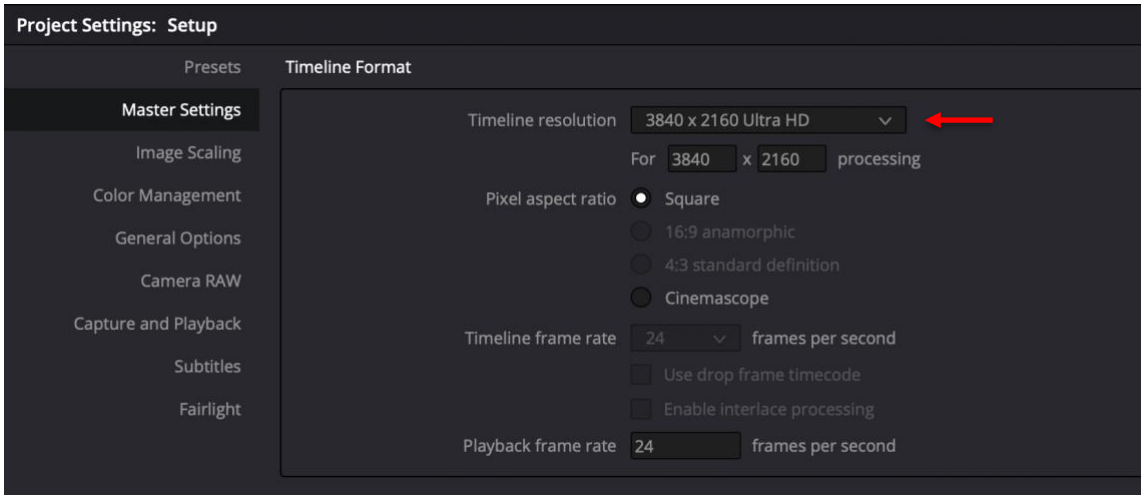
Note 1: From the Inspector, you can set the video bit depth (8-bit, 12-bit for 10 and 12-bit; 16-bit is not supported by Spectra) or leave as Default to pass the source bit depth (image on right).

Note 2: The OpenFX plugin for DaVinci Resolve and Avid Media Composer are covered by the "SpectraAVID" license/activation, and if not activated, reports that the "Spectra AVID license is missing."

Note 3: OpenFX uses RGB, 4:4:4 chroma subsampling; Spectra will convert this to 4:2:2 unless the 4:4:4 license option has been activated and enabled.

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.

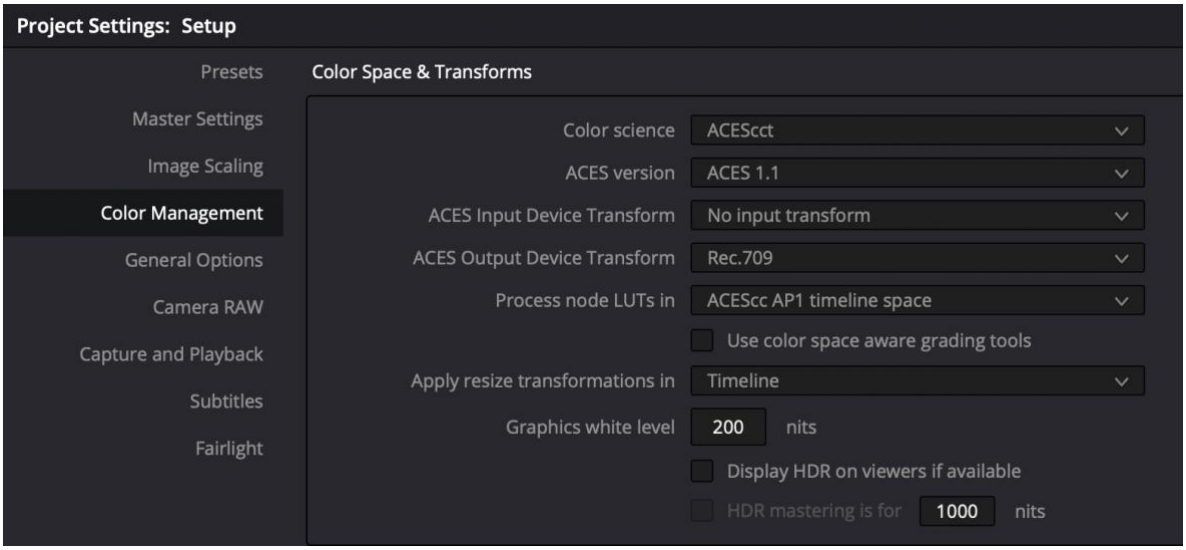


Using ACES and other Color-space Standards

Here we use ACES as an example, but this applies to other standards, e.g., DaVinci Wide Gamut. The basic goal is to deliver Rec.709/Rec.2020/P3 to Spectra while editing with an expanded gamut.

Using ACES: 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.

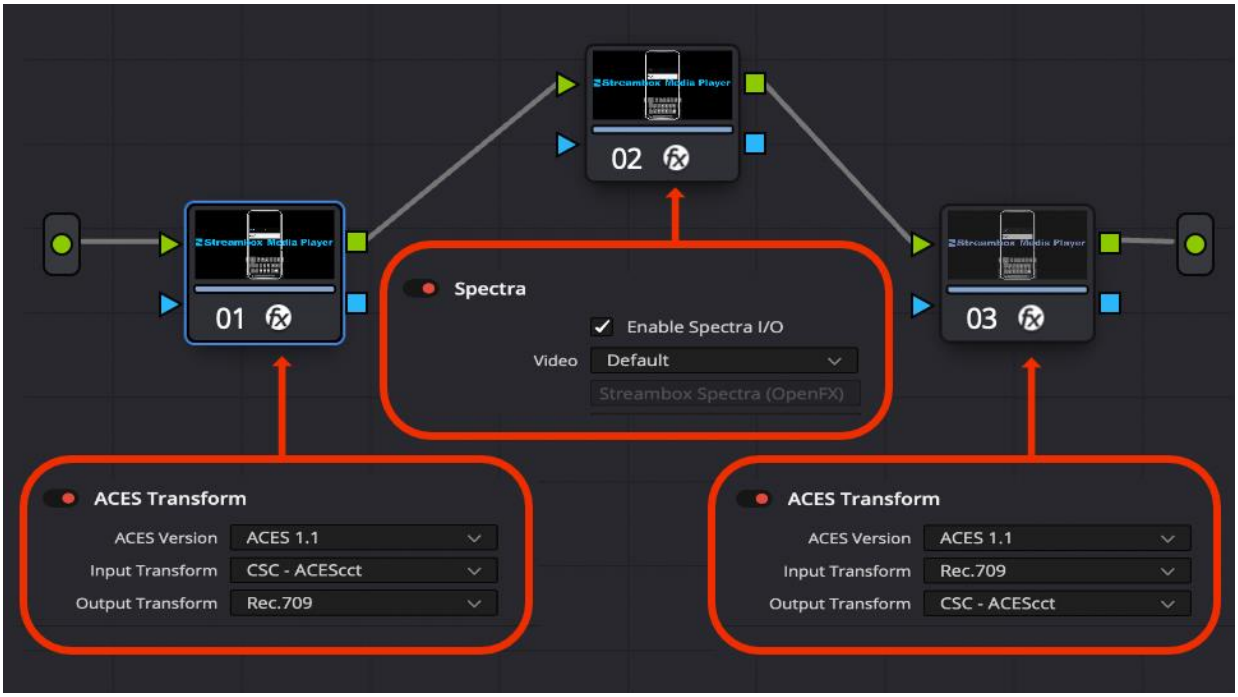


2. On the Color page, switch focus to Timeline (as described above) and add 3 Corrector nodes.

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

4. To the first node (01), add ‘ACES Transform’ (or ‘Color Space 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’ (or ‘Color Space 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)



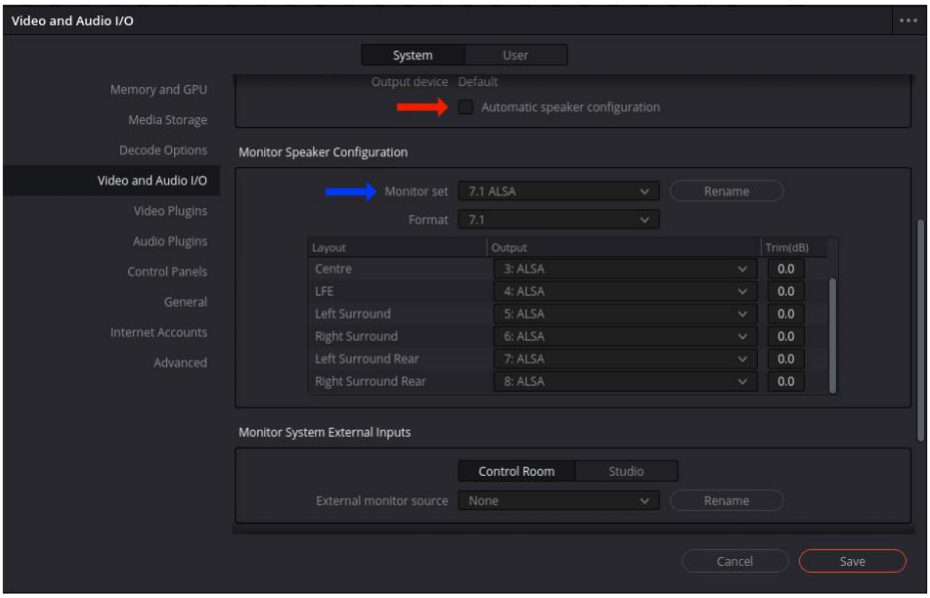
6. Once these changes have been made, you can do a simple scrub of the timeline to make sure Spectra is receiving a representative image.
7. You may have to modify the Input and Output Gamma settings. For the first node, you want to match, as best you can, the Input Gamma with the color space, e.g. DaVinci Intermediate and set the Output Gamma to Rec.709 or Rec.2020. For the third node, you reverse this, e.g. set the Input Gamma to Rec.709 or Rec.2020 and the Output Gamma to DaVinci Intermediate (or whatever was used for Input in the first node).

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

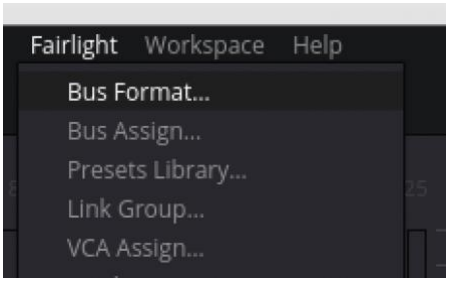
Multi-Channel Audio

Streambox Spectra has the capacity to support up to 16 audio channels. Currently, DaVinci Resolve for Linux can output up to 8 ALSA channels (mono, stereo, 5.1, and 7.1); stereo by default (DaVinci Resolve 17.4.2 or later). Here are the steps to support both 5.1 and 7.1 multi-channel audio.

1. Open the ‘Preferences’ dialog (DaVinci Resolve menu)



2. Under ‘Video and Audio I/O’ tab, uncheck ‘Automatic speaker configuration’ (red arrow) in the Audio I/O section
3. Under the ‘Monitor Speaker Configuration’ sections, select on open set, and rename it. In this example, we renamed it 7.1 ALSA (blue arrow)
4. Under format, select 7.1
5. You will then have to assign each channel its designation. For example, Left will be 1:ALSA, Right will be 2:ALSA, …, Right Surround Read will be 8:ALSA.
6. Click ‘Save’
7. Now select ‘Bus Format’ from the Fairlight menu.
8. Now make sure ‘Bus 1’ is set to 7.1 and click OK
9. Don’t forget to set ‘Audio Channels’ to 8-Ch under the Audio/Video tab of Spectra and apply any new settings.



You are now ready to stream 8 audio channels via Spectra.

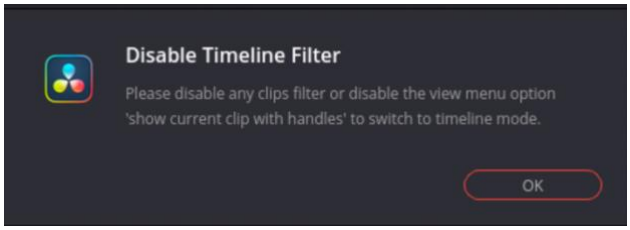
Troubleshooting

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).

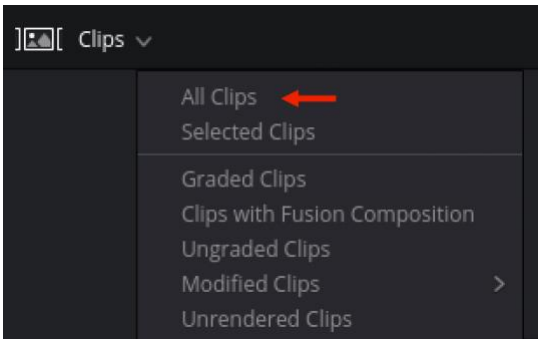
OpenFX failure: If the Spectra OpenFX plugin initially fails, you may have to delete the OFXPluginCache.xml file. This file is located in the ~/Library/Application Support/Blackmagic Design/DaVinci Resolve folder.
From the Go menu of the Finder, select 'Go to Folder…' and enter the path above.

Note: Resolve defaults to 16-bit output. For HDR workflow Spectra must be set to ACT-L5 (System page) and 10 or 12-bit Color Bit Depth on (Video/Audio page) for correct resolution to be displayed.

Disable Timeline Filter error: When selecting the 'Timeline' node field on the Color page, you may be presented with the following error. This generally means that a "Clips" filter is applied .



To temporarily work around this, you can select the 'All Clips' in the 'Clips' dropdown on the 'Deliver' page (upper left). Then return to the 'Color' page and select the Timeline node field.

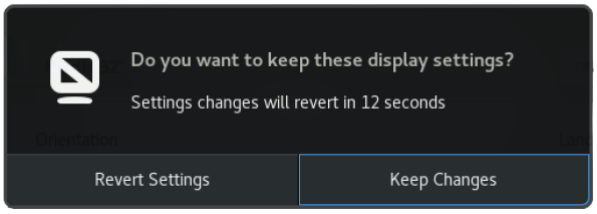


Display Resolution

When editing media, it is often desired to work with a higher resolution than the standard offered with AWS. We recommend upping the resolution to at least 3840 x 2160 (16:9) as follows:

1. Click the 'Applications' menu (upper left-hand corner of CentOS window)
2. Select 'System Tools' from left-hand list
3. Select 'Settings' from right-hand list
4. Under Settings, select 'Devices' (may have to scroll to see 'Devices' item)
5. Under Devices, select 'Displays'
6. Here set 'Resolution' to the desired level (click to open list)
7. Make sure the DCV Viewer window is maximized, and your monitor can support the resolution selected

8. Click ‘Apply’ (upper right corner of dialog window)
9. Click ‘Keep Changes’ to accept the current changes



10. Click the ‘Connection’ menu of the DCV Viewer and select ‘Display Resolution’
11. Make sure the desired resolution is selected and click ‘Close’

You are now ready to work in the desired display resolution.

Contact Information

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