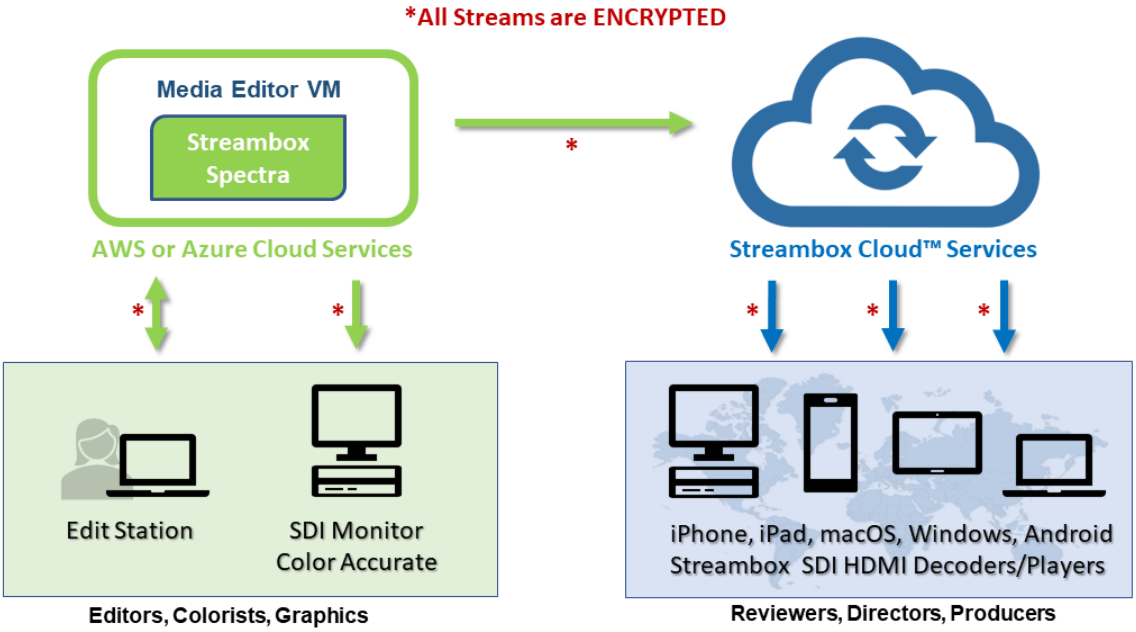
Streambox® Spectra™



Setup Guide (Windows)

Note: This document reflects the current feature-set which may change without notice (January 2023). We will attempt to keep all users up to date on any such changes.

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Introduction

Streambox Spectra is a software-based encoder that delivers near lossless streaming. Spectra runs as a device plug-in for video editing software that can be used locally or on a cloud-based setup.

Video technology software, such as Avid Media Composer, Adobe Premiere Pro, Blackmagic Design DaVinci Resolve, and others, are now being deployed on virtual cloud-based systems or from remote home offices. There are two main limitations to this approach, 1) lack of sufficient resolution and color accuracy for critical review and color grading, and 2) long latencies for high-resolution video.

Using Spectra, an editor or colorist can deliver real-time, high-quality video for review to almost any computer or mobile device, 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

Required Software/Hardware

- Windows 10 (64-bit) on a 6 Core (8 to 24 cores recommended) system, 16GB or greater RAM (32GB recommended for UHD/4K), and high-performance GPU recommended.

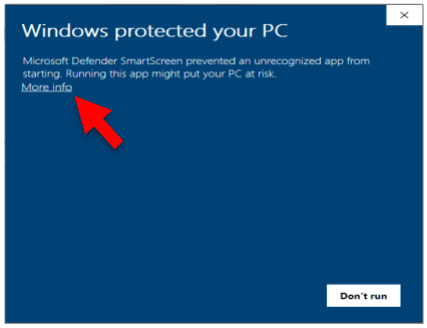
Overview

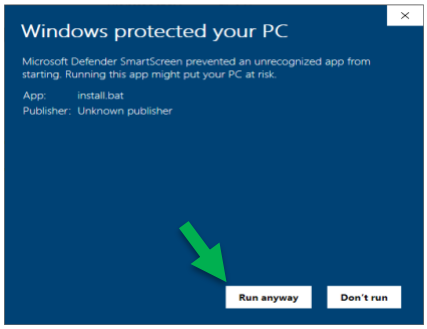
Streambox Spectra has three main components:

- Spectra Encoder Services (ACT-L3, ACT-L5) – encoding engine
- Plugins for application connectivity
- Spectra Control Panel – Utility to configure and control Spectra Encoder Service

Installation

NOTE: Since this is a Release Review installation, Windows and Security Software may at times attempt to restrict its running or installation. In these cases, you can override these protections. For example, you may get the following Windows warning (right); then click 'More info' (red arrow) and then 'Run anyway' (green arrow).



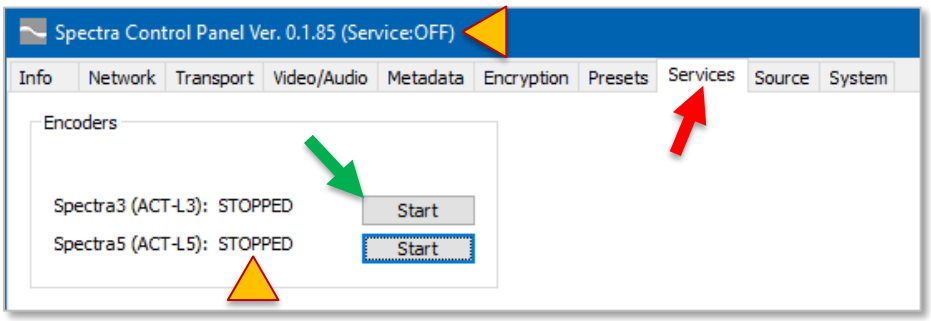


1. Download and install Spectra

2. Open the download folder (zip or exe file) and double-click the installer file.

3. After installation is complete, you can find the Spectra Control Panel shortcut on the Start menu, under the Streambox folder.
   a. Run '**Spectra Control Panel**'

4. Start **Spectra3** Service
   Note: You may skip this step if Spectra3 or Spectra5 is already Running.
   From the 'Services' tab (red arrow), click the 'Start/Stop' button for Spectra3 or Spectra5 (see green arrow). The Service status appears in the title bar and in-line with the service (see orange wedges).



Activation

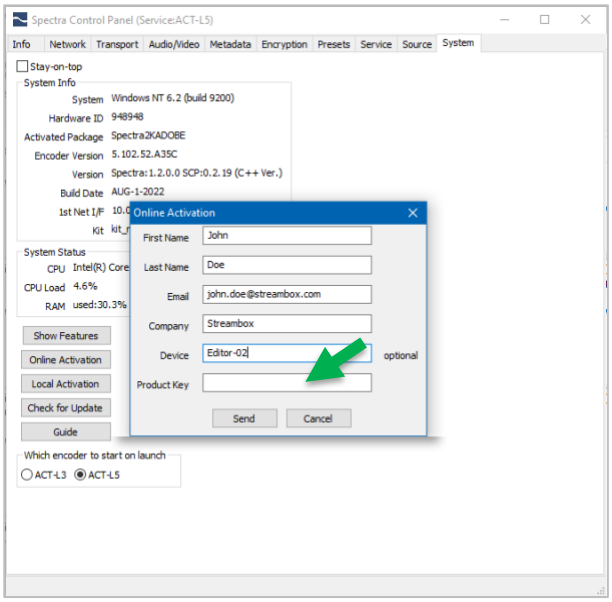
There are two methods to activate Spectra, its plugins, and additional features under the System tab. Once activated, you can click ‘Show Features’ to see what features were activated.

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.

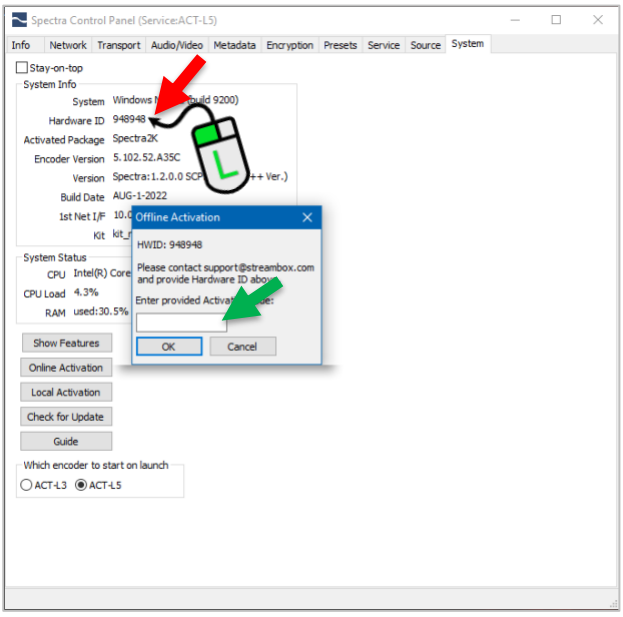


2. ***Offline Activation*** supports single activation for each instance of Spectra.

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

   - Obtain Hardware ID: open ‘System’ tab (look under System Info, red arrow, click to copy to clipboard)
   - Email Hardware ID to:
     sales@streambox.com
   - Please ask to activate as:
     “Chroma4K” or “ChromaHD"
   - Click Local Activation and enter the Activation Code (green arrow), then click ‘OK’

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



Check for Updates

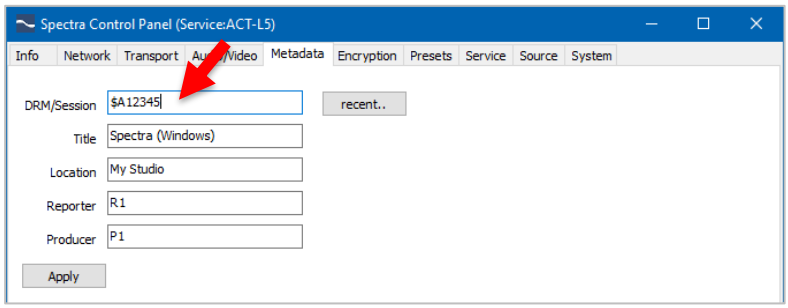
From the System tab you can ‘Check for Update’ versions of Spectra.

Session DRM

Spectra utilizes Streambox Sessions to simplify connectivity between the primary user and 1 to 10 end users (more than 10 end users can be connected with additional services). You will need to set up a Session, Set the Session DRM, and set the Server IP:

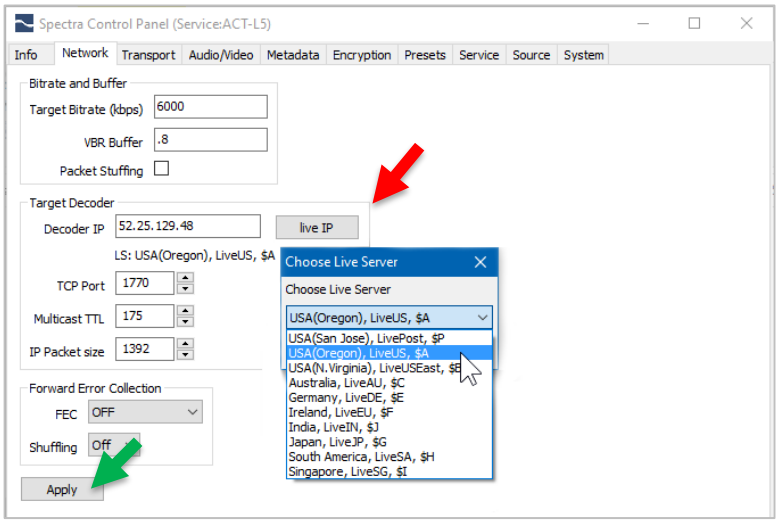
1. Setup or choose a current Session (remember, only one encoder can stream to an individual Session at a time). If you are not familiar with Streambox Sessions, please refer to the Sessions Quick Start Guide.

2. Set the Session DRM.
   Under the ‘Metadata’ tab, enter the Session DRM (red arrow). If you have previously entered a DRM, it will appear under the ‘recent…’ button



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

3. Select the Target Decoder IP (live IP) under the **Network** tab to match the Session DRM prefix ($_). See red arrow. Use the table below to match the Session DRM prefix ($ plus next character). For example, in the image above, the sample Session DRM is $A12345, so from the table below, or the ‘live IP’ dropdown to the right, you see that the Live Server is “USA (Oregon), LiveUS, $A”. You can simply click the ‘live IP’ button to select this server (or manually enter the IP address).



   Note: Remember to click ‘Apply...’ to save/initiate any changes (green arrow).

IP

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

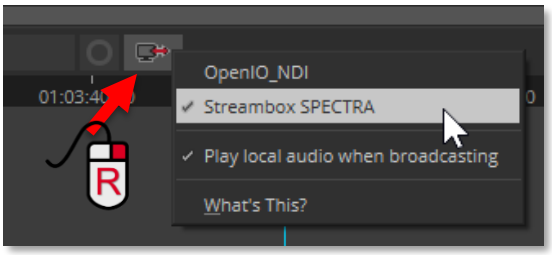
Name	Public IP Address	Location
Live**US**.streambox.com	52.25.129.48	USA (Oregon), LiveUS, **$A**
Live**USEast**.streambox.com	54.83.19.155	USA (N. Virginia), LiveUSEast, **$B**
Live**AU**.streambox.com	52.62.2.246	Australia, LiveAU, **$C**
Live**DE**.streambox.com	54.93.179.19	Germany, LiveDE, **$D**
Live**EU**.streambox.com	54.247.100.52	Ireland, LiveEU, **$F**
Live**JP**.streambox.com	52.69.71.156	Japan, LiveJP, **$G**
Live**SA**.streambox.com	54.233.86.10	South America, LiveSA, **$H**
Live**SG**.streambox.com	52.76.243.157	Singapore, LiveSG, **$I**
Live**IN**.streambox.com	52.66.83.26	India, LiveIN, **$J**
Live**Post**.streambox.com	52.8.239.106	USA (San Jose), LivePost, **$P**

Skip (only if needed)

Spectra will automatically be assigned an IP address. If for some reason this assigned IP address is inappropriate or in conflict, you can force Spectra to skip it by adding the IpSkip0="<IP to Skip>" to the settings.xml file found in the 'C:\ProgramData\Streambox\SpectraUI' folder. For this change to take place, you must first Stop Spectra Service, make changes to settings.xml, and then Start Spectra Service.

Setting up Spectra in Avid Media Composer

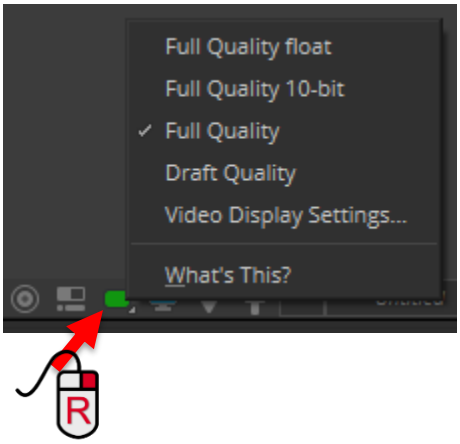
1. Set Avid output to 'Streambox SPECTRA' and 'Play local audio…' by right-clicking the 'HW/SW' switch (red arrow) located on the top margin of the timeline.



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**.

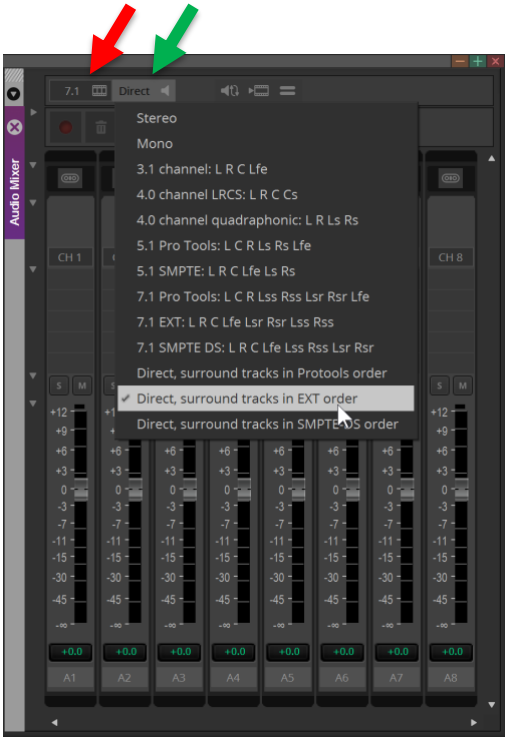
   Note: If you are using the Spectra5 (ACT-L5) service (see Start/Stop Spectra Services below) and working on a 10-bit project, you will want to select 'Full Quality 10-bit'. If you are working on a 12-bit project, use 'Full Quality float'.



Multi-Audio Channels (Avid)

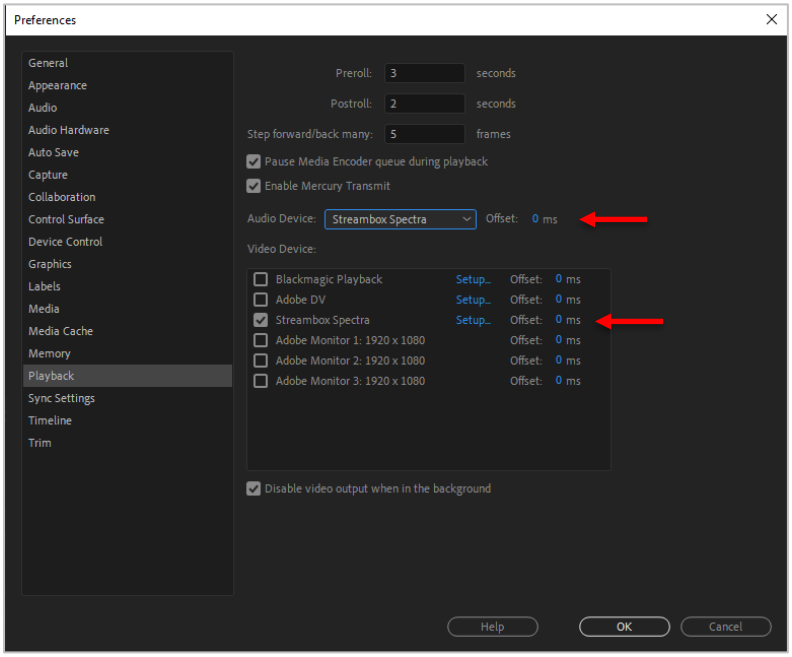
Streambox Spectra supports mono to 8 channels of audio (mono, stereo, quadraphonic, 5.1, and 7.1) output from Avid Media Composer. To setup audio channels:

1. Open the Audio Mixer (Tools menu) in Media Composer
2. From the Sequence Mix Format dropdown (red arrow), select Stereo, 5.1, or 7.1 respectively
3. From the Mix Mode Selection dropdown (green arrow), select a specific mode or 'Direct, surround tracks in EXT order' (the latter should output 1-for-1 to Spectra).
4. Select the Video/Audio tab in the Spectra Control Panel.
5. Select Audio Codec AAC or PCM.
6. Select Audio Channels (Mono for 1-ch, Stereo for 2-ch, 4-ch for Quadraphonic, 5.1ch for 5.1 or 6-ch, and 8-ch for 7.1)

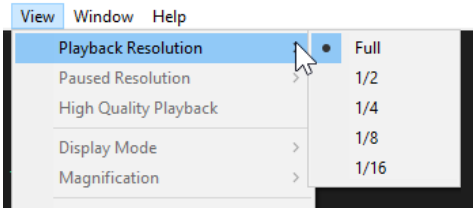


Setting up Spectra in Adobe Premiere Pro

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; you must then use a Streambox Media Player/Decoder to hear the audio.



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



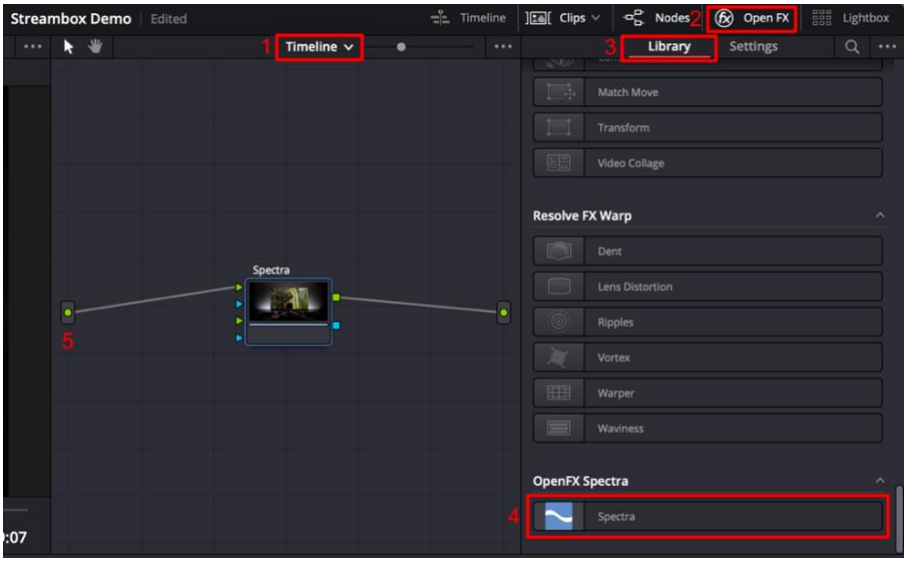
Note 1: Always install Spectra after Adobe Premiere Pro (you can re-install Spectra if this was not the case)

Note 2: After Spectra is installed, you will want to close both Spectra and Premiere Pro and then open Premiere Pro and then Spectra. This will ensure that both applications have updated their settings.

Note 3: Always open Spectra after Premiere Pro has been open. The same applies for Adobe After Effects.

Setting up Spectra in Blackmagic DaVinci Resolve

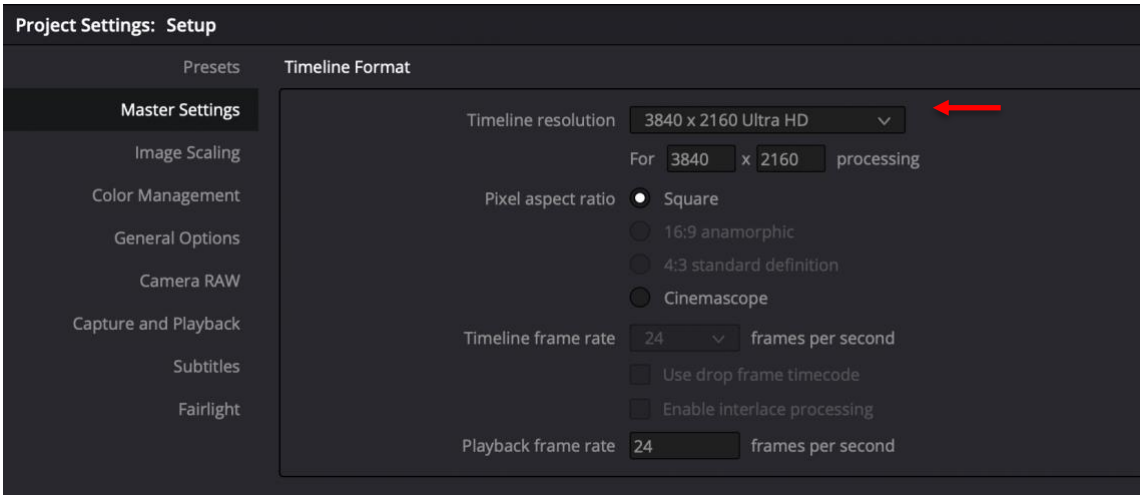
You must apply the Spectra node to the timeline: Under the ‘Color’ page 1) Switch the focus to Timeline, 2) Open the OpenFX panel, 3) Select the Library list, 4) find and drag the Spectra node into the node field, and 5) Connect the Spectra node to timeline in and out.



Note: 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.

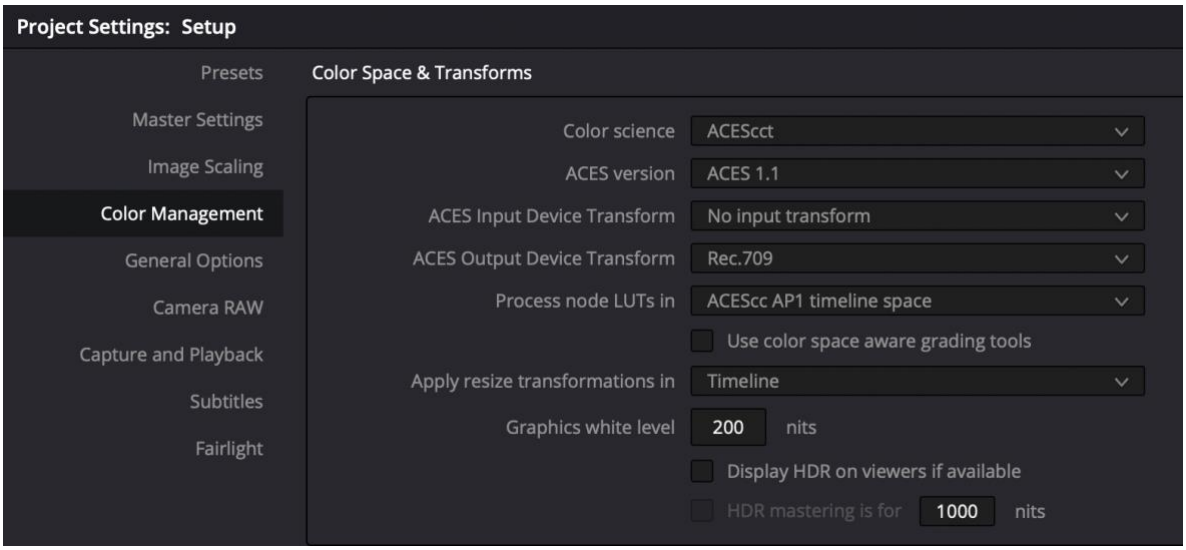


Using ACES and other Colorspace Standards

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.



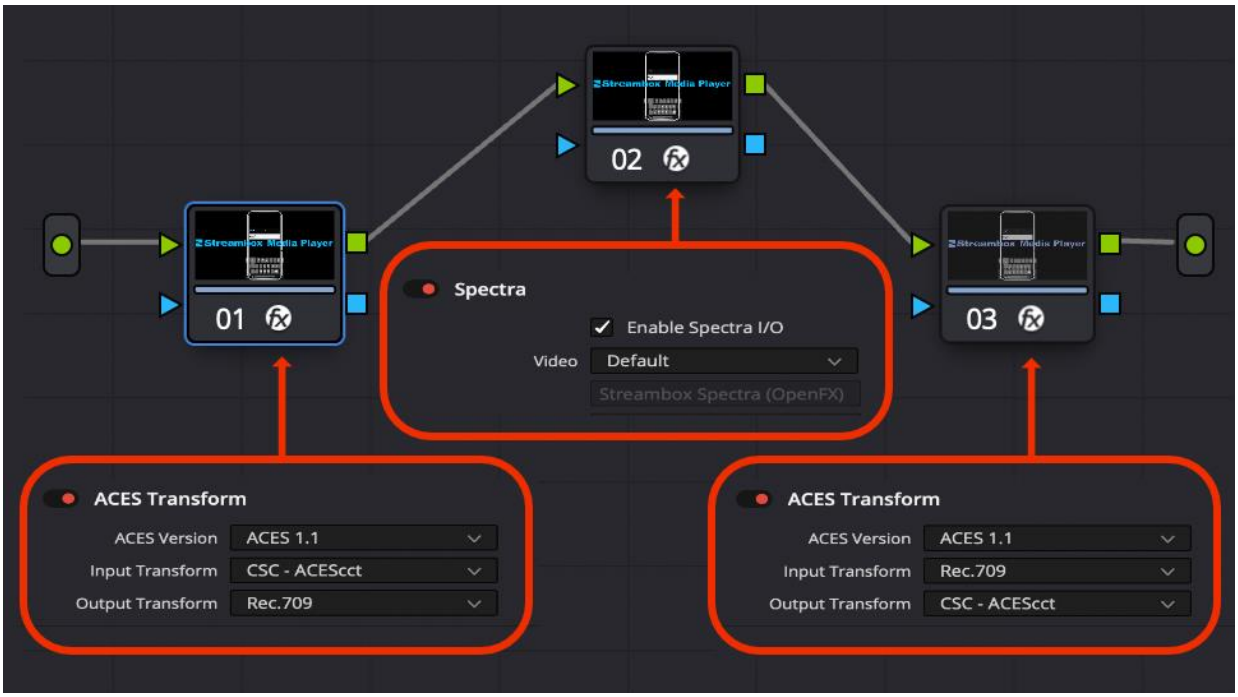
2. On the Color page, switch focus to Timeline (as described above) and add 3 Corrector nodes.

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 colorspace; 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.

Troubleshooting

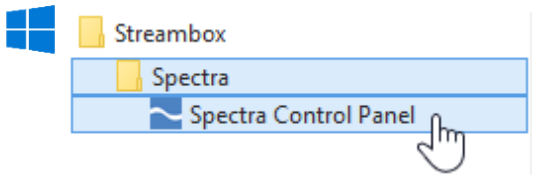
Background scrolling in Spectra: If Render Cache (in Playback Menu) is set to Smart you may see the image in Spectra scroll by as background rending takes place (during play or scrubbing). If this becomes an issue, you can set the Render Cache to User and then only render the cache when needed. Furthermore,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

Using the Spectra Panel

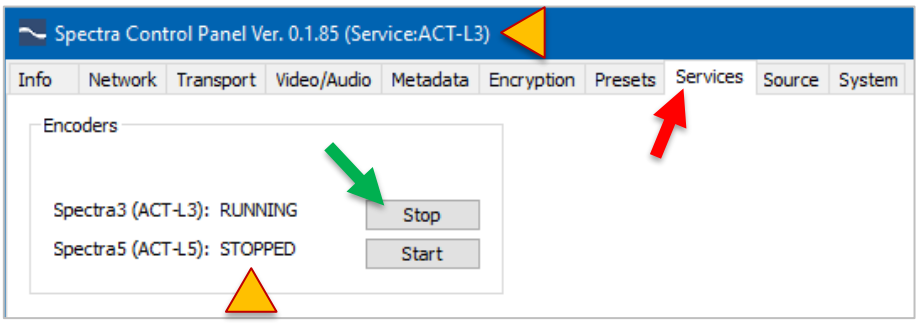
You used the Spectra Panel during installation, let's take a closer look. If the Spectra Control Panel is closed, you can reopen it: Click the 'Spectra Control Panel' item under the Streambox folder on the Start menu.



Note: We recommend pinning the Spectra icon to the taskbar. When Spectra is open, right-click the Spectra icon on the taskbar and select Pin to Taskbar.

Start/Stop Spectra Services

The Spectra service refers to the video encoder. You have two flavors, ACT-L3 and ACTL5. ACT-L5 supports everything that ACT-L3 does plus 10 and 12-bit color depth, HDR, and the 4:4:4 color profile; ideal for colorist review. For initial review, we recommend starting with ACT-L3 since it is optimized for lower bandwidth and Rec.709. Open the Service tab (red arrow) and click on the Start/Stop switch associated with ACT-L3 (green arrow). Make sure the 'RUNNING' status is displayed. The Service status appears in the title bar and in-line with the service (orange wedges).



Stream Settings

There are many parameters that can be used to fine-tune a video stream. As a starting point, we provide basic Presets (see Presets tab section below). If needed, below are links for those who want a more detailed review.

Transport, LDMP:

https://www.streambox.com/knowledgebase/advanced-ldmp

Stream latency:

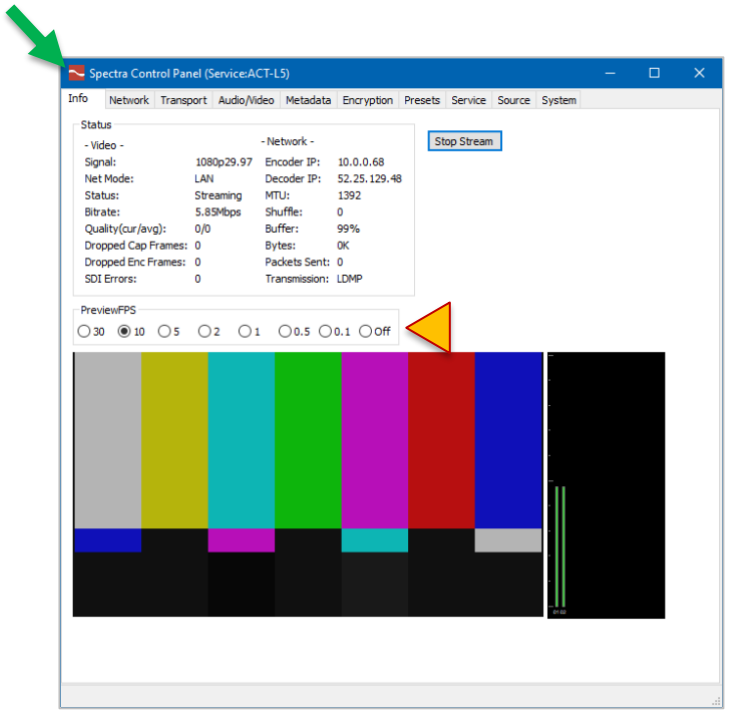
https://www.streambox.com/knowledgebase/guide-to-reducing-stream-latency-delay

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-media-player-setup

Info tab

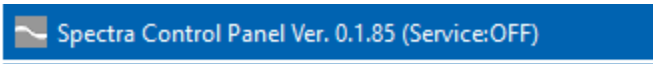
The ‘Info’ tab provides the stream status, a ‘Start/Stop Stream’ switch button, a Preview panel, and audio meter.



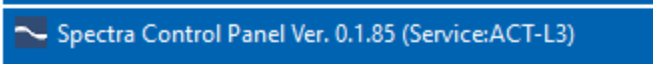
You can preview a facsimile of what is being delivered to the Spectra Encoder by setting the ‘Preview FPS’ (frames per second) selector to a value other than Off (orange wedge).

Note 1: The service status is displayed in the title-bar. If the service status displays OFF, go to the Services tab and start either Spectra3 or Spectra5.

Note 2: The Streambox icon and title bar (green arrow) display the Stream/Service status; for example:

1. 

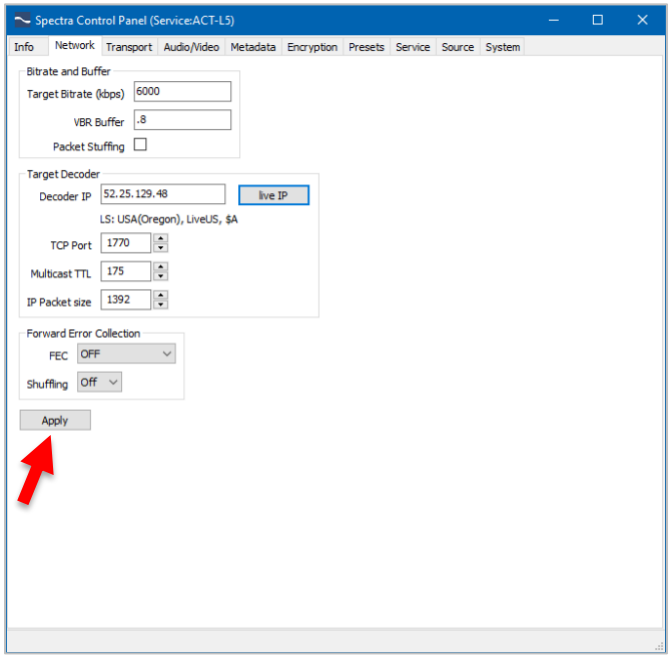
Gray, No Service. See Services tab
2. 

Red, Streaming / ACT-L5 Service
3. 

Blue, Paused / ACT-L3 Service

Network tab

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



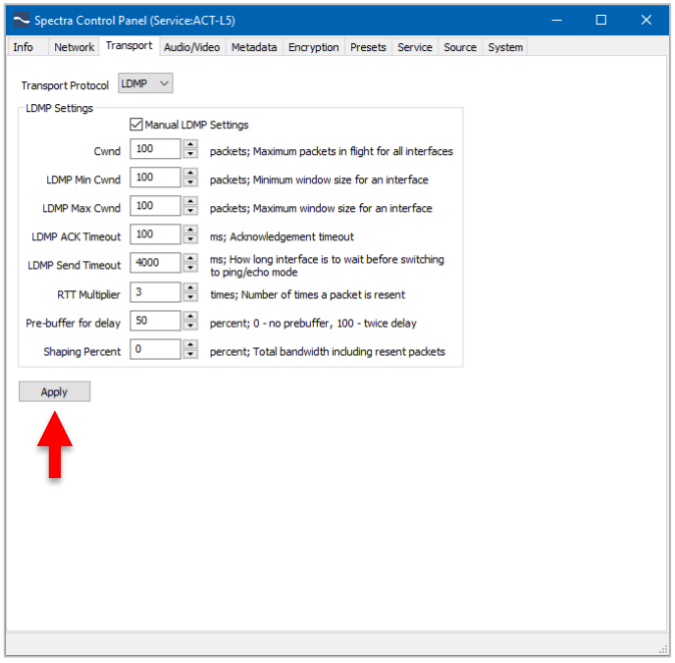
Note 1: The Target Decoder IP must match the Server where the Session was created. See **Session DRM** section above.

Note 2: The other values here are good starting points for HD (you can always increase the Target Bitrate to 8000 or more if your network supports the upload rate).[1] Rates up to 100 Mbps (100000) have been tested for UHD, 10-bit streams.

Note 3: Remember to click ‘Apply’ to save/initiate any changes (red arrow, above).

Transport tab

The Transport tab is where you set the LDMP 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 at, or below a bitrate of 12Mbps. See Presets tab section below for more options.

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

Note: Remember to click ‘Apply’ to save/initiate any changes (see red arrow).

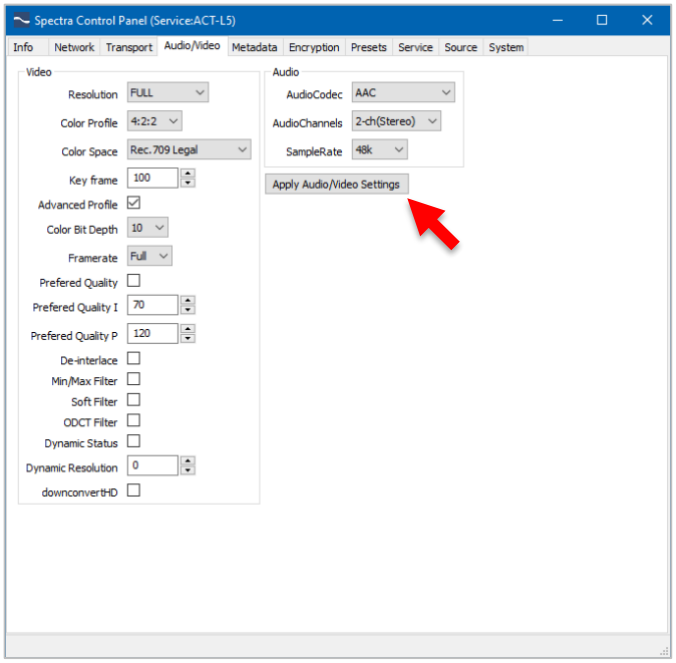
[1] Your network upload rate should support at least the Target Bitrate + 20% to ensure a stable stream.

Video/Audio tab

The Video/Audio tab is where the properties of the video stream are defined, e.g., Resolution, Color Profile, Audio Codec, Audio Channels (mono, stereo, … 16-ch), etc.

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

Note: Remember to click ‘Apply...’ to save/initiate any changes (see red arrow).



Metadata tabs

The Metadata tab was covered earlier. See **Session DRM** section above.

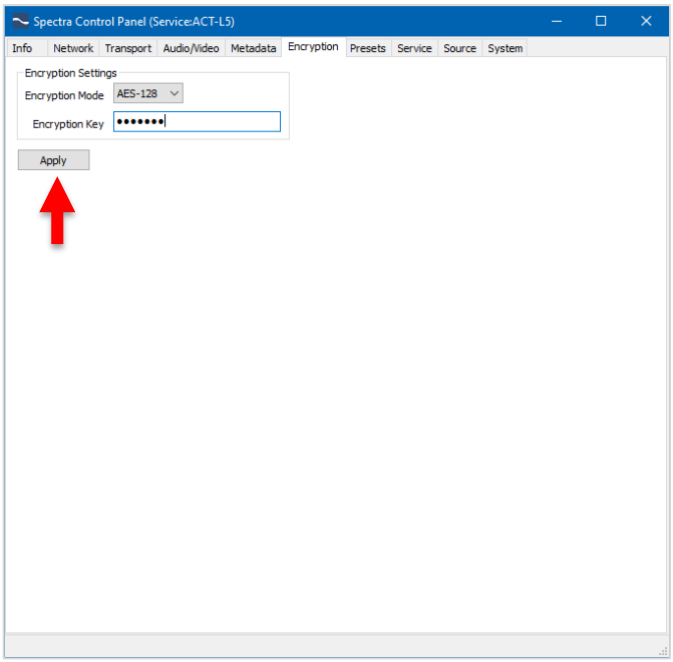
Encryption tab

The Encryption tab is where the user can set the key and initiate encryption (AES 128-bit encryption is supported by default, 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.

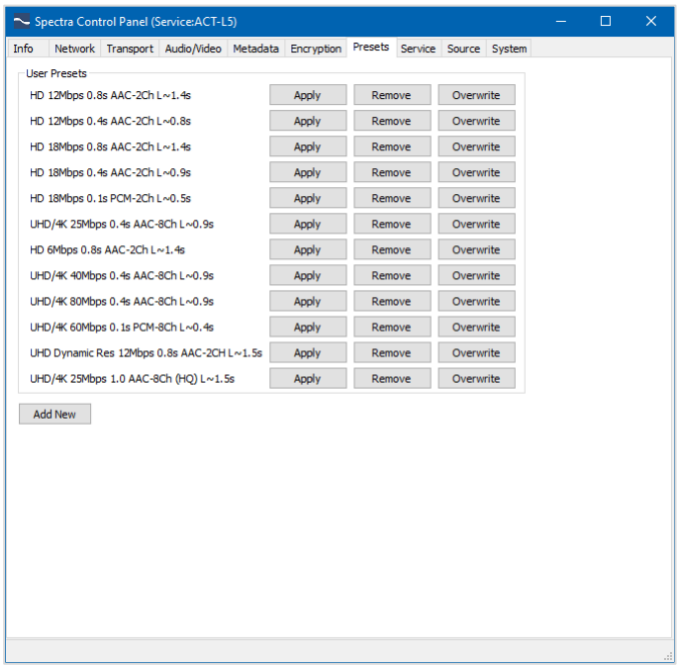
Note 2: Remember to click ‘Apply’ to save/initiate any changes (see red arrow).

Note 3: It is recommended that encryption keys should contain at least 11 alphanumeric characters with both upper and lower case.



Presets tab

The Preset tab is where presets for Encoding, Bitrate, Latency, Network, FEC, Video/Audio settings, and Metadata values can be defined. To initiate a preset, click ‘Apply’ that is associated with the desired preset.



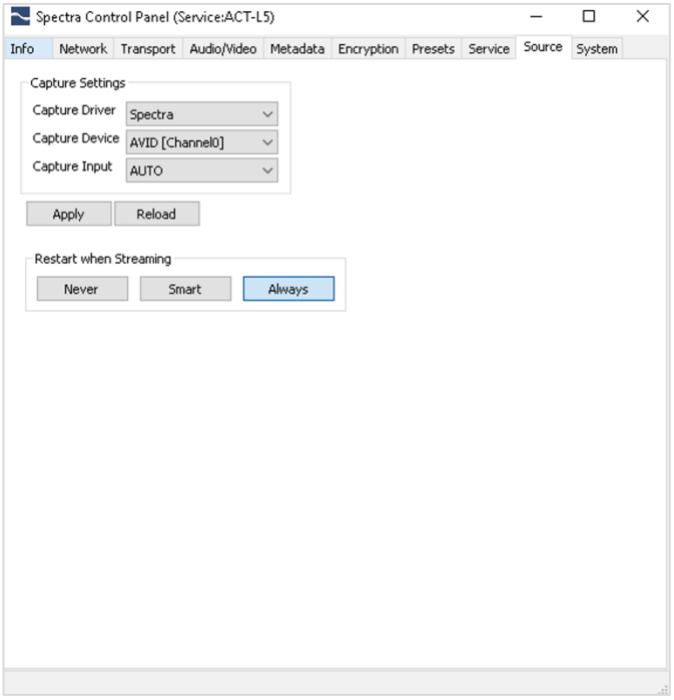
To create your own presets, set the values/properties you desire on the various tabs and then click ‘Add New…’ to create a new preset or ‘Overwrite’ to replace a current preset.

Services & System tabs

The Services and System tabs were covered above under Installation.

Source tab

The Source tab is where you can select the input source. If this is set to Spectra, it will receive input from a video editor such as Avid Media Composer, Adobe Premiere Pro, or Blackmagic Design DaVinci Resolve (depending on which apps you have activated; see Features page below. The available sources are polled when Spectra is first launched, so open the Spectra Control Panel after you have launched the intended source.



In addition to specific apps, Spectra can receive input from NDI sources, Web/USB cameras, Blackmagic Design products, and OpenFX applications.

NDI Tools

Since Spectra ingests NDI streams, you can take advantage of several of the NDI Tools 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

For Adobe workflows: We recommend updating to Spectra v1.19 (or above) which improves Adobe workflow when working with video source clips in multiple formats which is common in news environment. This feature allows the encoder to restart automatically following a change in settings/source/or signal; as follows:

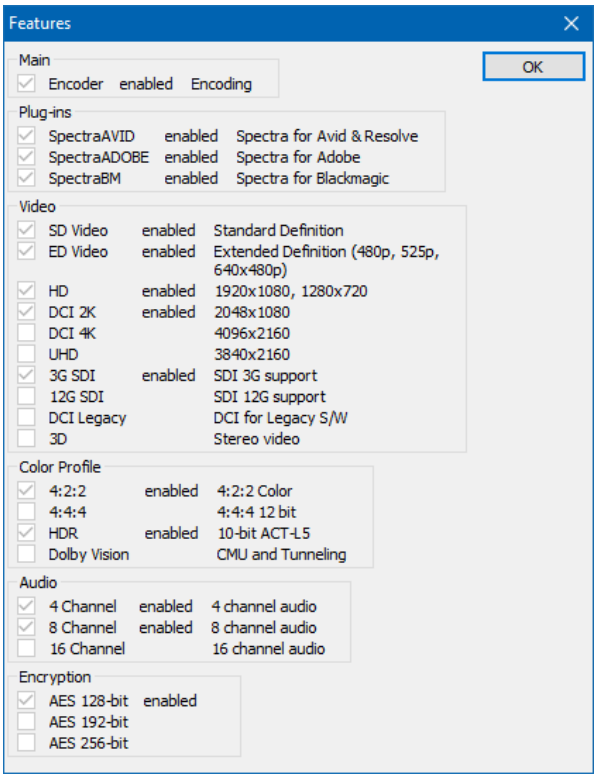
Never – stream continues in initial format (e.g., 1080i59.94) when switching between different source files like 1080p30 or 1080p60, etc.
Note: It will hold the last frame if you restart or close Adobe (this differs from previous version of Adobe, where the signal could be switched to higher resolution for 4K streams).

Smart – allows preview of video clips in its original format (e.g. playback 1080i, 1080p, etc.), frame-rate and resolution.
Note: The last valid frame persists if Adobe is closed or restarted.

Always – is used in live broadcast workflow to always restart stream with source change or signal loss.

Features page

From the System tab, click the 'Show Features' button to open the Features page. Here you can view all activated features and their expiration date (i.e., to help keep cost under control, features can be licensed for the duration of a specific project).



Troubleshooting

If you are experiencing issues installing Spectra or the stream quality is not as expected, feel free to contact our Support team (see below). Below is a list of known issues.

1. Both AJA and Blackmagic plug-ins for Avid Media Composer conflict with the Spectra plug-in. Renaming the AJA and Blackmagic ACF extensions to ACFX should fix this issue.
2. Media Player for iOS and macOS (Catalina, Big Sur) fully support all streams from Spectra. The legacy Media Player for Windows only supports ACT-L3 streams.
3. Video streaming requires stable network connectivity, so where possible a direct LAN connection is preferred (though a strong WiFi or Mobile connection can be acceptable, especially for HD).
4. If at first you don't succeed, feel free to contact our Support Team.

Specifications

- HD: 1920x1080p, 1920x1080PsF,1920x1080i, 1440x1080i, 1280x1080i, 960x1080i, 1280x720p, 960x720p, 800x720p, 640x720p
- 2K DCI: (2048x1080) 23.98, 24 fps
- UHD (3840 x 2160) 23.98 ,24, 25, 29.97, 30 fps
- 4K DCI (4096 x 2160) 23.98 and 24 fps
- Audio Codec: 8-ch PCM and AAC, CELP, GSM frequency 44.1/48 KHz
- Bitrate: 2 to 80 Mbps (depending on network upload capacity)
- Color: RGB, XYZ, YUV 4:4:4, 4:2:2, 4:2:0
- ACT-L3 codec:
  8-bit depth, Rec.709, P3
- ACT-L5 codec:
  8, 10, 12-bit depth, HDR, Rec.709, Rec.2020, P3

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