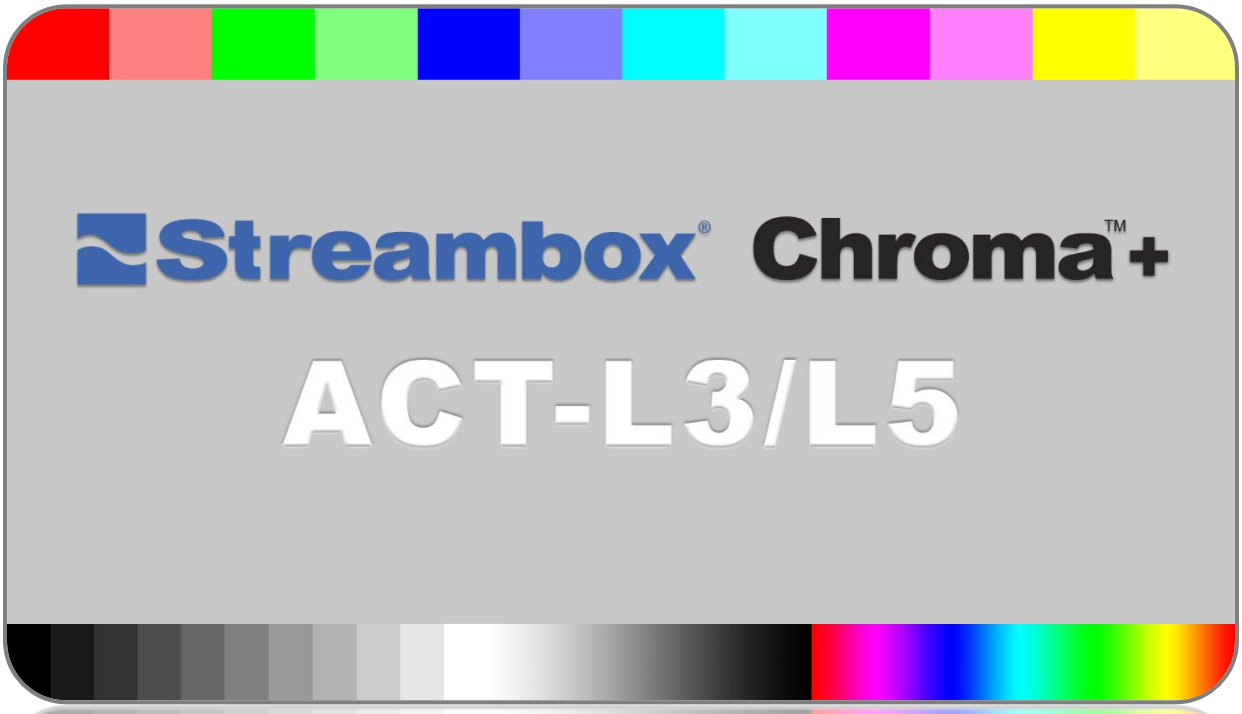


Chroma+ Receiver – Quick Start Guide

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.

Document History:
April 2020. Document 1.03. DB
April 2020. Updated 8-Channel information. 1.04. DB
May 2020. Updated LDMP, Page 6. 1.05. DB
June 2020. Updated Dolby support. 1.06. DB

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Table of Contents

Introduction 3
Getting Started 3
What's Needed 3
Initial Connections 3
Initial Setup 3
Login 3
Web Interface 4
Info (tab) 4
Network (tab) 4
Pull Stream 4
Cloud Server IP Addresses 6
LDMP Settings 6
Output (tab) 7
General Settings 7
HDMI Output Settings 7
Absolute Mode Settings 8
Accounts (tab) 8
Encryption (tab) 8
System (tab) 8
Log (tab) 8
Workflows 8
Dynamic Dolby Vision Metadata Workflow 9
Dolby Vision Absolute mode 9
Rec.709 / SDR Workflow 9
Setting Up the Workflow 10
6 and 8-Channel Audio Workflow 11
Appendix 11
TECHNICAL SPECIFICATIONS 11
Contact Information 12
Privacy Notice 12

Introduction

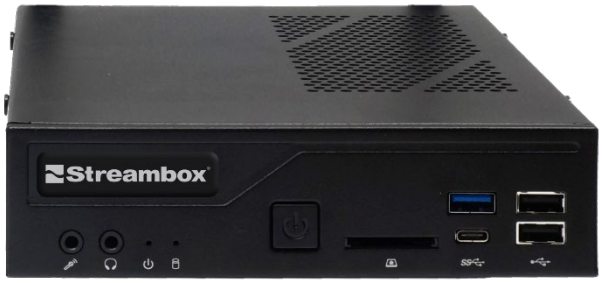
Streambox Chroma+ is a video receiver for professionals that supports Dolby Vision tunneling for delivery to prosumer TVs. In addition, it benefits from the Streambox 4:4:4, 12-bit codec and video transport via cloud servers around the world.

Streambox Chroma+ is for artists who desire to preserve the best signal quality and color fidelity possible with Prosumer Dolby Vision TV sets. Both Streambox 12-bit codec and Dolby Vision metadata tunneling over HDMI are key components for color precise and friction free review sessions.

Streambox Chroma+ outputs Dolby Vision metadata to ensure automatic color space gamma. Video levels and Dolby metadata are preserved on the TV set, while working in 12-bit color precision.

Unlike common file-based solutions, Streambox Chroma+ allows for review, where color or editorial decisions are needed in real-time, over the internet.

Getting Started



What's Needed

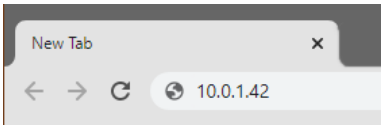
To take full advantage of what Chroma+ can offer, you will need to connect it via HDMI to a prosumer or professional TV set that supports Dolby Vision.

Initial Connections

Plug in the power cord, connect the unit via an appropriate HDMI cable to a monitor, turn on the monitor and the Chroma+ unit.

Initial Setup

The units IP address will be displayed on the attached monitor. Using an Internet browser on the same network, enter the units IP address into the browser's address field (see image, with example IP, 10.0.1.42).

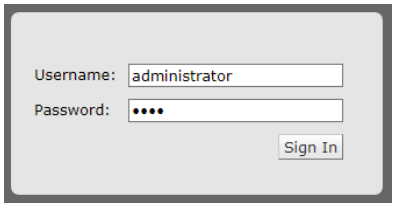


If the interface provides a choice to select Encoder or Decoder, select Decoder (see image to right).



Login

The factory-set Username is 'administrator' and 'demo' for Password. After you have completed the setup, we recommend that you change the login username and password.

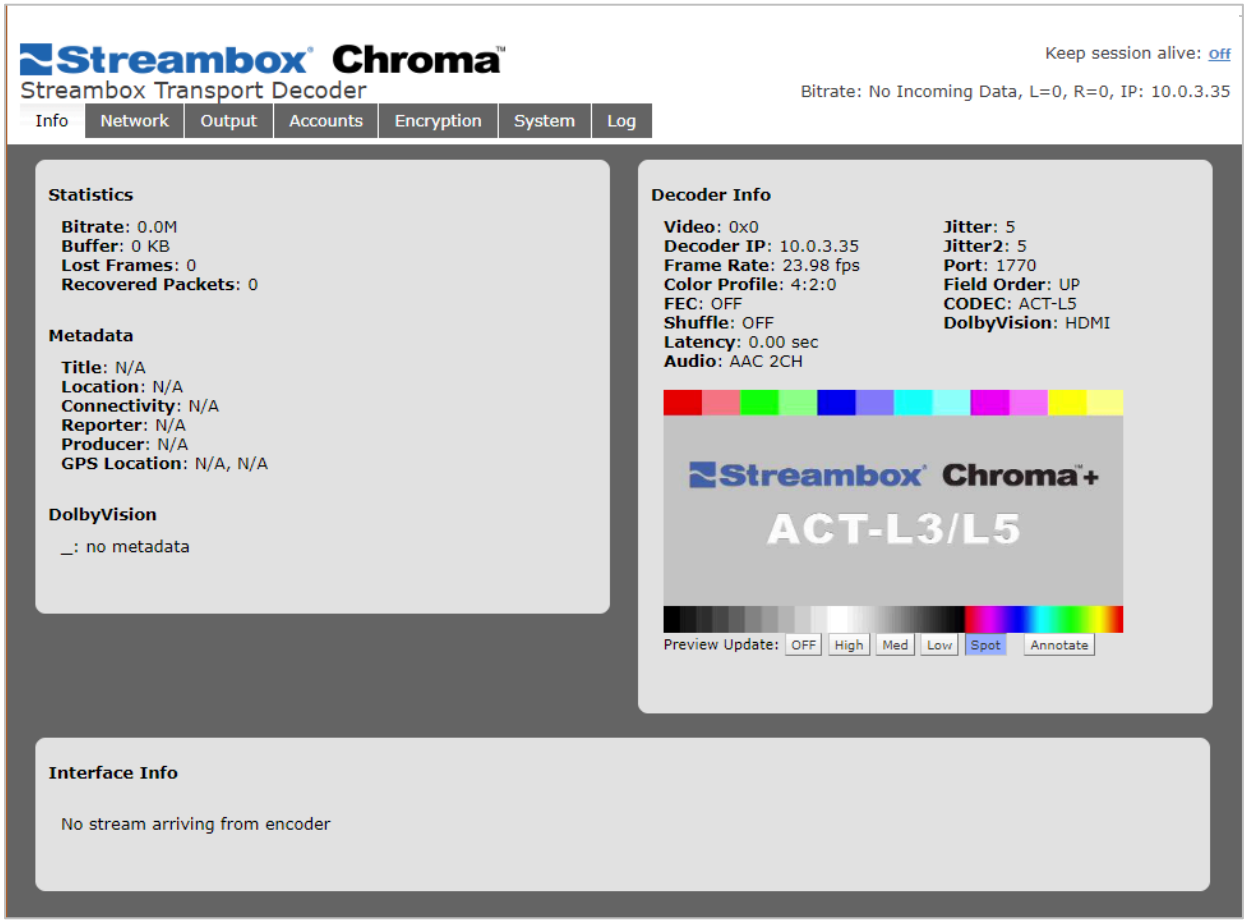


Web Interface

The web interface provides full status reporting and remote control of the Chroma+ unit.

Info (tab)

The Info page is essentially the status report of the incoming video stream plus any embedded metadata: Title, Location, Reporter, Producer, and GPS Location. Basic Decoder Information is displayed along with a preview window.

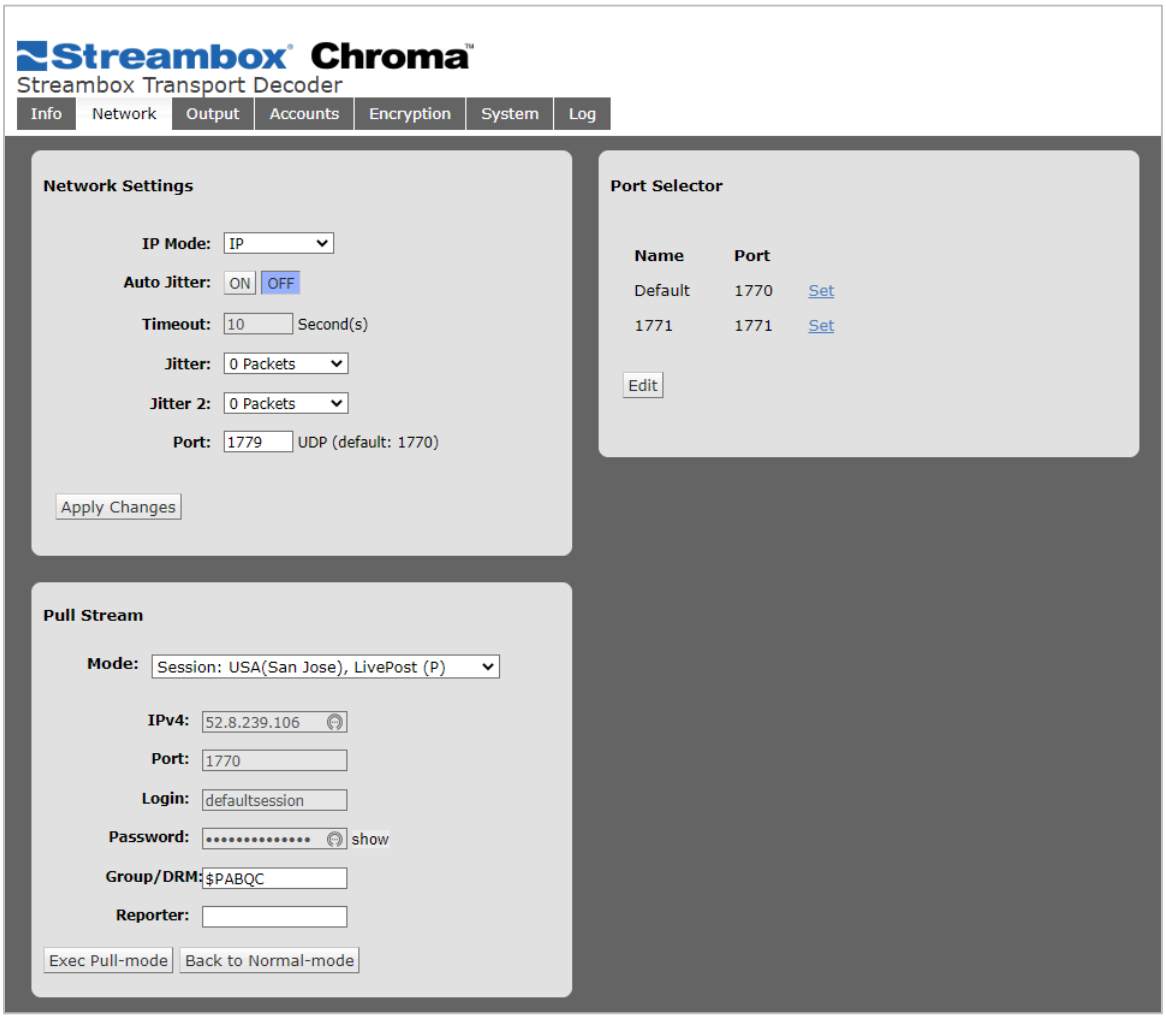


Network (tab)

The Network page is where standard network settings are managed. Most importantly, this is where you set the incoming port number should you need to change the default UDP port, 1770. This may be needed for port-forwarding and firewall compatibility.

Pull Stream

Pull Stream allows a stream or Session to be pulled from the Streambox Cloud. Note: the properties below are divided into Sever mode and Sessions where applicable.



- **Mode**: Select ‘Server (Custom)’ to pull directly based on Reporter name and Login account, or select one of the Session servers based on the letter following the ‘$’ sign in the Session ID. For example, if your Session ID was $PABQC, you would select ‘LivePost (P)’ from the dropdown list.
- **IPv4**: For Server Mode use the IP address of the closest server to your location from the table below
- **Port**: For Server Mode set UDP port address (1770 is the default)
- **Login**: For Server Mode use your Streambox Cloud account username
- **Password**: For Server Mode use your Streambox Cloud account password
- ***Group/DRM***
  Server: Enter the account Group (DRM) name
  Sessions: *enter the Session ID provided by the session host. Make sure it starts with $*
- ***Reporter***
  Server: enter the exact characters of the Reporter value from the Encoder metadata
  Sessions: <leave blank>
- Click ‘Exec Pull-mode’ (the pull should start in about 1 minute)

- Click ‘Back to Normal-mode’ to cancel the pull and return to unicast mode

Cloud Server IP Addresses

Use this link to get the most current list of Streambox Cloud Server IP Addresses.

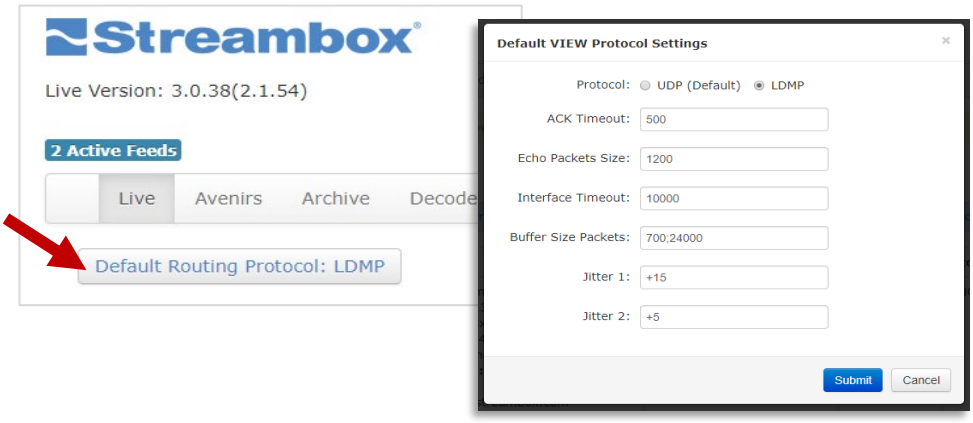
https://streambox.force.com/support/s/article/streambox-cloud-server-ip-addresses

Live Server	Code $	IP Address	Region
Live**US**.streambox.com	A	52.25.129.48	USA (Oregon)
Live**Post**.streambox.com	P	52.8.239.106	USA (N. California)
Live**USEast**.streambox.com	B	54.83.19.155	USA (N. Virginia)
Live**DE**.streambox.com	E	54.93.179.19	Europe (Frankfurt)
Live**EU**.streambox.com	F	54.247.100.52	Europe (Ireland)
Live**JP**.streambox.com	G	52.69.71.156	Asia Pacific (Tokyo)
Live**SG**.streambox.com	I	52.76.243.157	Asia Pacific (Singapore)
Live**AU**.streambox.com	C	52.62.2.246	Asia Pacific (Sydney)
Live**IN**.streambox.com	J	52.66.83.26	Central Asia (India)
Live**SA**.streambox.com	H	54.233.86.10	South America (Sao Paulo)

LDMP Settings

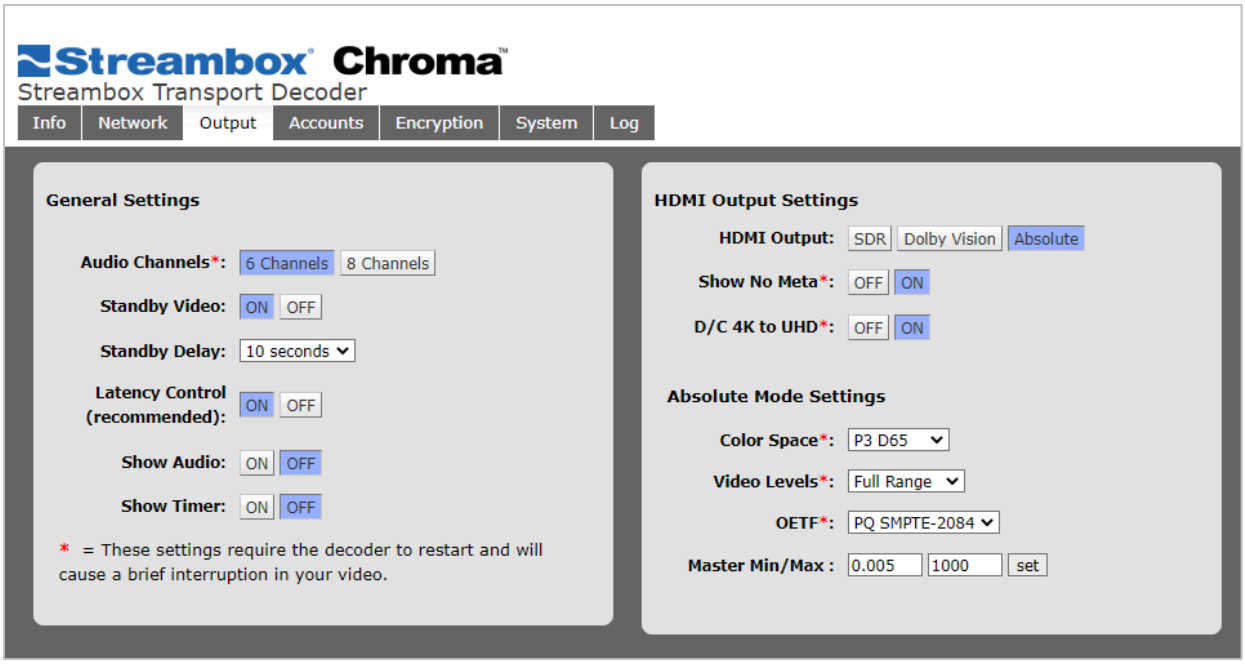
Sessions use the default LDMP routing settings of the account used to create the session. It is important that these properties are properly set. 1) Log onto a Live Server (e.g., Live.Streambox.com) using the same account under which the Session was created. 2) From the ‘Live’ tab of the Streambox Live Server page, click on the ‘Default Routing Protocol’ button (see red arrow below) to open the ‘Default VIEW Protocol Settings’ page (see image below). 3) The values on the example here are generally a good starting point and will work with most Sessions. For more information on LDMP settings see:

https://streambox.force.com/support/s/article/Cloud-Decoder-LDMP-Settings



Output (tab)

The Output page is where general output settings like number of audio channels, show audio meters and timer on the display, and output format are found. It is also where the Genlock settings are located.



General Settings

- **Audio Channels**: In the current version, only 2 channels are supported (this setting is ignored).
- **Standby Video**: Enables the 'colorbars' output when Chroma+ is not receiving a stream. If disabled, it shows a freeze-frame of the last processed frame, or a blue screen.
- **Standby Delay**: Sets how long the decoded will be without a signal before displaying the standby video image (as above).
- **Latency Control**: If disabled, the decoder is allowed unlimited time to decode the stream. This option may be used for testing purposes to isolate frame loss and sync issues in relation to decoder CPU usage. Disabling latency control is not recommended for any Streambox system in production.
- **Show Audio**: N/A
- **Show Timer**: N/A

HDMI Output Settings

- **HDMI Output**:
  SDR: Standard Dynamic Range (defaults to Rec.709)
  Dolby Vision: Enables Dolby Vision metadata in Tunneling or CMU modes
  Absolute: Enables Dolby Vision without tonal mapping (see Absolution Mode Settings below)

- **Show No Meta**: When no Dolby Vision metadata is present, NO-METADATA message is continuously displayed
- **D/C 4K to UHD**: Center cut 4K to UHD for TV's without 4K DCI support in Dolby Vision

Absolute Mode Settings

- **Color Space**: Select desired standard color space (Rec.709, Rec.2020, P3 D65)
- **Video Levels**
  Full Range: Used for film/video production, computer graphics, and video graphics
  Video Level: Standard SMPTE levels for consumer electronics
- **OETF** (Opto-electronic Transfer Function): SDR CTA.861, HDR CTA.861, PQ SMPTE-2084
- **Master Min/Max**: brightness in nits

Accounts (tab)

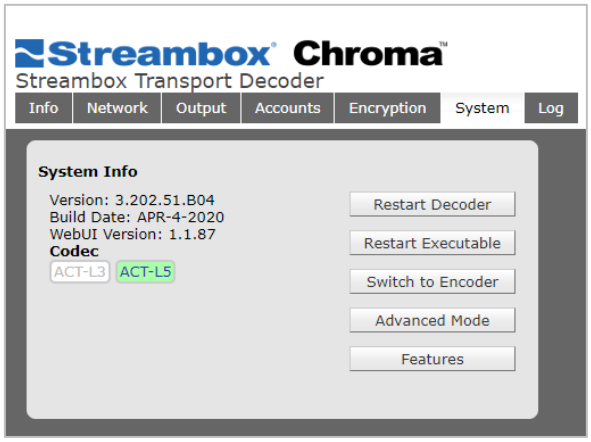
The Accounts page is only displayed for account administrators and is where accounts are created or modified.

Encryption (tab)

The Encryption page is where you set the Decryption Key, if applicable. The key must be an identical match to the encryption key used on the encoder. If the keys do not match, you will see an 'ENCRYPTED ERROR' on the Info page.

System (tab)

The System page provides System Info, ACT-L3/ACT-L5 codec switch and buttons for Decoder restart, Executable restart, Switch to Encoder (not active), and Advanced Mode (for Support). Also, there is a Features button for a list of all activated features and instructions for activating additional features.



Log (tab)

The Log page provides a method to log all decoder activity for diagnostic purposes.

Workflows

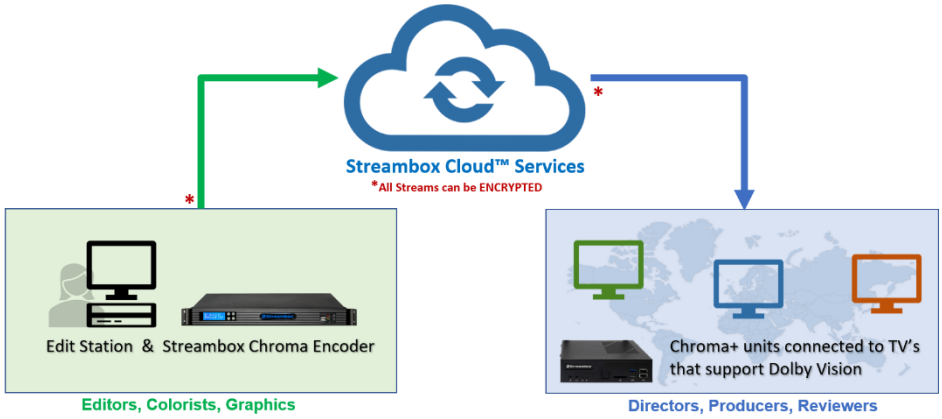
Two three workflows are currently supported:

1. Dynamic Dolby Vision metadata workflow from colorist to a decision maker
2. Dolby Vision Absolute mode
3. SDR – Standard dynamic Range (Rec.709)

Dynamic Dolby Vision Metadata Workflow

Chroma+ is ideal for colorist output (4:4:4, 12-bit signal with Dolby Vision[1] metadata) from software solutions like DaVinci Resolve[2], Baselight[3], or Autodesk Flame[4] via Streambox Chroma Encoders. Streambox Chroma+ units receive live streams from Streambox Cloud Services allowing directors and producers to review color precise, encrypted, video streams in real-time on connected TV's that support Dolby Vision.

Dolby Vision tunneling over HDMI is utilized to switch supported TV's into the correct color space and gamma and map the video signal to the best picture quality possible with Dolby Vision metadata. No end user configuration is necessary – you get the exact color every time!



Dolby Vision Absolute mode

Dolby Vision Absolute mode provides HDR video without tone mapping while preserving Color Space, Video levels and Gamma. Master monitor peak brightness is used as a clipping ceiling.

For example, using DaVinci Resolve in iCMU mode, grade your content for master monitor peak brightness of 650 nits with local preview on Sony X300, Send SDI 4:4:4 12-bit video to Streambox Chroma encoder and receive on Chroma+.

On the Chroma+ select absolute mode with peak brightness set at 650 nits in Absolute mode. Your Chroma+ connected TV will then display without any tone mapping while matching Sony X300 levels.

Please note that some combinations like PQ in Rec.709 are not supported. Currently, only LG C/B series were confirmed to work properly in Absolute mode.

Rec.709 / SDR Workflow

Turn Dolby Vision Output OFF. Select Rec.709 in Color Space, correct video level (usually legal for most applications except Cinema), SDR OETF (is ignored).

[1] https://www.dolby.com/us/en/professional/index.html
[2] https://www.blackmagicdesign.com/products/davinciresolve/
[3] https://www.filmlight.ltd.uk/products/baselight/overview_bl.php
[4] https://www.autodesk.com/products/flame/overview

Setting Up the Workflow

For Dolby Vision each item in the workflow has specific settings according to the table below. Start with the Media Source and then find the appropriate row of settings for each item. See legend below for an explanation of settings.

For Dolby Vison output we recommend to use 4:2:2 12 bit encoding profile, since Dolby Vision tunneling is 4:2:2 12 bit natively.

Media Source	Encoder	CMU Target Profile	Dolby Vision tunneling (HDMI) Chroma+		SDI CHROMA 4K
SDI-in to Encoder	Color Space	Select in Color Grading S/W	CMU Metadata present	Absolute	encoder or decoder
RGB P3D65	ICT[5]	N/A	N/A	P3D65/Full/SDR	4:4:4
RGB 2020	ICT[5]	N/A	N/A	2020/SDR	4:4:4
RGB 709	ICT[5]	not implemented[1]	not implemented[1]	709/Video/SDR	4:4:4
RGB P3D65 PQ	ICT[5]	P3 D65 - multiple nits	AUTO	P3D65, PQ 2084	4:4:4
RGB 2020 PQ	ICT[5]	Rec.2020 - multiple nits	AUTO	2020, PQ 2084	4:4:4
RGB 709 PQ	ICT[5]	N/A	N/A	709, PQ 2084	4:4:4
4:2:2 709	pass		N/A, RGB only for CMU	709/Video/SDR	4:2:2
4:2:2 2020	pass		N/A, RGB only for CMU	2020	4:2:2
4:2:2 P3	N/A		N/A, RGB only for CMU	N/A	4:2:2
4:2:2 709 PQ	pass		N/A, RGB only for CMU	P3D65, PQ 2084	4:2:2
4:2:2 2020 PQ NCL	pass		N/A, RGB only for CMU	2020, PQ 2084	4:2:2
4:2:2 2020 PQ CL	not implemenTeed[2]		N/A, RGB only for CMU	not implemenTeed[2]	4:2:2
4:2:2 2020 ITP	not implemenTeed[3]		N/A, RGB only for CMU	not implemenTeed[3]	4:2:2

Legend:

pass: color space selection is ignored for 4:2:2
[1] DV TVs do not map to SDR, CMU signal is always in PQ
[2] Can be added, contact beta@streambox.com for feature request
[3] Can be added, contact beta@streambox.com for feature request
[5] ICT only when used with Chroma+, Native RGB will be supported shortly
For Chroma+ target, 4:2:2 10 or 12 bit
Native RGB supported when Target is Chroma 4K with 4:4:4

Media Source - SDI signal provided to Chroma Encoder
Color Space - Color space selection in Encoder Config panel
CMU Target Profile - selected in Color Grading software, profile should match color space
Dolby Vison tunneling (HDMI) Chroma+ modes:

- CMU Metadata - Metadata from Embedded CMU packets
- Static mode - selected Metadata on Chroma +

6 and 8-Channel Audio Workflow

The Streambox Chroma+ can receive 8 channels of audio. Most TV's that support Dolby Vision or HDR only offer 2 channels of audio so an external system is required for both a 6 and 8 channel workflow. Currently, we have confirmed this workflow on LG SK9Y (5.1.2 with satellite speakers) soundbar and Onkyo TX-NR676 (5.1.2) A/V Receiver. We expect that other 5.1 and 7.1 soundbars and receivers will also be compatible.

Appendix

TECHNICAL SPECIFICATIONS

RESOLUTION

4K DCI - 4096 x 2160p *see note 1
UHD - 3840 x 2160p
2K DCI - 2048 x 1080 *see note 2
HD - 1920 x 1080, 1280 x 720p
SD - 720 x 480p, 720 x 576p

COLOR SPACE SUPPORT (DOLBY VISION mode)

P3 D65 in RGB and Y-Cr-Cb (N-CL)
Rec. 2020 in RGB and Y-Cr-Cb (N-CL)
Rec.709 in RGB and Y-Cr-Cb
XYZ
ITP

EOTF (DOLBY VISION mode)

SMPTE 2084 (PQ)
Gamma 2.4
Gamma 2.0
Linear (planned support)

COLOR PROFILES

4:4:4 12-bit *see note 3
4:4:4 10 or 8 bit
4:2:2 12/10/8 bit
4:2:0 12/10/8 bit

FRAME-RATES

FILM: 23.98, 24
VIDEO: 25, 29.98,30,50,59.94,60

AUDIO

Stereo Audio via HDMI
6 and 8 Channel audio breakout
Future 5.1/7.1 support via Dolby Digital/Plus

DOLBY VISION METADATA

Dynamic
User defined (static)

CONNECTIVITY

HDMI Output
USB-C
USB3 x 2
LAN 10/100/1000 Mbps
WiFi (optional): WiFi 6, 2.4GB, 5GB
IEEE802.11/a, b, g, n, ac, ax; dual antennas

MISCELLANEOUS

AES 128-bit encryption
AES 256-bit encryption option
Up to 80 Mbps bitrate

DIMENSIONS

W168mm x D200mm x H43mm
(192mm with WiFi antennas)

POWER

DC 12-19V 65W(max)
AC Adapter accessory 100-240V 90W

WEIGHT

3 lbs (1.4kg)

ACCESSORY

WIFI-6 (802.11/ax) adapter, WiFi Antenna x2
Low power Bluetooth for iPhone control

Notes:

Qualified Color Grading software for Dynamic Metadata DaVinci Resolve, Autodesk Flame

1. HDMI display dependent, center cut to 3840x2160 if not supported, with user selectable 4K to UHD center cut
2. HDMI display dependent, center cut to 1920x1080 if not supported
3. Dolby Vision Tunneling native profile is 4:2:2 12-bit

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