Lightspeed Live Stream

User Guide

Live Stream 2.2

March 2018

243096

Copyrights and Trademark Notices

Copyright © 2018 by Telestream, LLC. All rights reserved worldwide. No part of this publication may be reproduced, transmitted, transcribed, altered, or translated into any languages without the written permission of Telestream. Information and specifications in this document are subject to change without notice and do not represent a commitment on the part of Telestream.

Telestream. Telestream, CaptionMaker, Episode, Flip4Mac, FlipFactory, Flip Player, Lightspeed, ScreenFlow, Switch, Vantage, Wirecast, Gameshow, GraphicsFactory, MetaFlip, and Split-and-Stitch are registered trademarks and MacCaption, e-Captioning, Pipeline, Post Producer, Tempo, TrafficManager, VidChecker, and VOD Producer are trademarks of Telestream, LLC. All other trademarks are the property of their respective owners.

Adobe. Adobe® HTTP Dynamic Streaming Copyright © 2014 of Adobe Systems All right reserved.

Apple. QuickTime, MacOS X, and Safari are trademarks of Apple, Inc. Bonjour, the Bonjour logo, and the Bonjour symbol are trademarks of Apple, Inc.

Avid. Portions of this product Copyright 2012 Avid Technology, Inc.

Dolby. Dolby and the double-D symbol are registered trademarks of Dolby Laboratories.

Fraunhofer IIS and Thomson Multimedia. MPEG Layer-3 audio coding technology licensed from Fraunhofer IIS and Thomson Multimedia.

Google. VP6 and VP8 Copyright Google Inc. 2014 All rights Reserved.

MainConcept. MainConcept is a registered trademark of MainConcept LLC and MainConcept AG. Copyright 2004 MainConcept Multimedia Technologies.

Manzanita. Manzanita is a registered trademark of Manzanita Systems, Inc.

MCW. HEVC Decoding software licensed from MCW.

MediaInfo. Copyright © 2002-2013 MediaArea.net SARL. All rights reserved.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Microsoft. Microsoft, Windows NT|2000|XP|XP Professional|Server 2003|Server 2008 |Server 2012, Windows 7, Windows 8, Media Player, Media Encoder, .Net, Internet

Explorer, SQL Server 2005|2008|Server 2012, and Windows Media Technologies are trademarks of Microsoft Corporation.

SharpSSH2. SharpSSH2 Copyright (c) 2008, Ryan Faircloth. All rights reserved. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

Neither the name of Diversified Sales and Service, Inc. nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Telerik. RadControls for ASP.NET AJAX copyright Telerik All rights reserved.

VoiceAge. This product is manufactured by Telestream under license from VoiceAge Corporation.

x264 LLC. The product is manufactured by Telestream under license from x264 LLC.

Xceed. The Software is Copyright ©1994-2012 Xceed Software Inc., all rights reserved.

ZLIB. Copyright (C) 1995-2013 Jean-loup Gailly and Mark Adler.

Other brands, product names, and company names are trademarks of their respective holders, and are used for identification purpose only.

MPEG Disclaimers

MPEGLA MPEG2 Patent

ANY USE OF THIS PRODUCT IN ANY MANNER OTHER THAN PERSONAL USE THAT COMPLIES WITH THE MPEG-2 STANDARD FOR ENCODING VIDEO INFORMATION FOR PACKAGED MEDIA IS EXPRESSLY PROHIBITED WITHOUT A LICENSE UNDER APPLICABLE PATENTS IN THE MPEG-2 PATENT PORTFOLIO, WHICH LICENSE IS AVAILABLE FROM MPEG LA, LLC, 4600 S. Ulster Street, Suite 400, Denver, Colorado 80237 U.S.A.

MPEGLA MPEG4 VISUAL

THIS PRODUCT IS LICENSED UNDER THE MPEG-4 VISUAL PATENT PORTFOLIO LICENSE FOR THE PERSONAL AND NON-COMMERCIAL USE OF A CONSUMER FOR (i) ENCODING VIDEO IN COMPLIANCE WITH THE MPEG-4 VISUAL STANDARD ("MPEG-4 VIDEO") AND/OR (ii) DECODING MPEG-4 VIDEO THAT WAS ENCODED BY A CONSUMER ENGAGED IN A PERSONAL AND NON-COMMERCIAL ACTIVITY AND/OR WAS OBTAINED FROM A VIDEO PROVIDER LICENSE IS GRANTED OR SHALL BE IMPLIED FOR ANY OTHER USE. ADDITIONAL INFORMATION INCLUDING THAT RELATING TO PROMOTIONAL, INTERNAL AND COMMERCIAL USES AND LICENSING MAY BE OBTAINED FROM MPEG LA, LLC. SEE HTTP://WWW.MPEGLA.COM.

MPEGLA AVC

THIS PRODUCT IS LICENSED UNDER THE AVC PATENT PORTFOLIO LICENSE FOR THE PERSONAL USE OF A CONSUMER OR OTHER USES IN WHICH IT DOES NOT RECEIVE REMUNERATION TO (i) ENCODE VIDEO IN COMPLIANCE WITH THE AVC STANDARD ("AVC VIDEO") AND/OR (ii) DECODE AVC VIDEO THAT WAS ENCODED BY A CONSUMER ENGAGED IN A PERSONAL ACTIVITY AND/OR WAS OBTAINED FROM A VIDEO PROVIDER LICENSED TO PROVIDE AVC VIDEO. NO LICENSE IS GRANTED OR SHALL BE IMPLIED FOR ANY OTHER USE. ADDITIONAL INFORMATION MAY BE OBTAINED FROM MPEG LA, L.L.C. SEE HTTP://WWW.MPEGLA.COM.

MPEG4 SYSTEMS

THIS PRODUCT IS LICENSED UNDER THE MPEG-4 SYSTEMS PATENT PORTFOLIO LICENSE FOR ENCODING IN COMPLIANCE WITH THE MPEG-4 SYSTEMS STANDARD, EXCEPT THAT AN ADDITIONAL LICENSE AND PAYMENT OF ROYALTIES ARE NECESSARY FOR ENCODING IN CONNECTION WITH (i) DATA STORED OR REPLICATED IN PHYSICAL MEDIA WHICH IS PAID FOR ON A TITLE BY TITLE BASIS AND/OR (ii) DATA WHICH IS PAID FOR ON A TITLE BY TITLE BASIS AND IS TRANSMITTED TO AN END USER FOR PERMANENT STORAGE AND/OR USE. SUCH ADDITIONAL LICENSE MAY BE OBTAINED FROM MPEG LA, LLC. SEE HTTP://WWW.MPEGLA.COM FOR ADDITIONAL DETAILS.

Limited Warranty and Disclaimers

Telestream, LLC (the Company) warrants to the original registered end user that the product will perform as stated below for a period of one (1) year from the date of shipment from factory:

Hardware and Media—The Product hardware components, if any, including equipment supplied but not manufactured by the Company but NOT including any third party equipment that has been substituted by the Distributor for such equipment (the "Hardware"), will be free from defects in materials and workmanship under normal operating conditions and use.

Warranty Remedies

Your sole remedies under this limited warranty are as follows:

Hardware and Media—The Company will either repair or replace (at its option) any defective Hardware component or part, or Software Media, with new or like new Hardware components or Software Media. Components may not be necessarily the same, but will be of equivalent operation and quality.

Software Updates

Except as may be provided in a separate agreement between Telestream and You, if any, Telestream is under no obligation to maintain or support the Software and Telestream has no obligation to furnish you with any further assistance, technical support, documentation, software, update, upgrades, or information of any nature or kind.

Restrictions and Conditions of Limited Warranty

This Limited Warranty will be void and of no force and effect if (i) Product Hardware or Software Media, or any part thereof, is damaged due to abuse, misuse, alteration, neglect, or shipping, or as a result of service or modification by a party other than the Company, or (ii) Software is modified without the written consent of the Company.

Limitations of Warranties

THE EXPRESS WARRANTIES SET FORTH IN THIS AGREEMENT ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. No oral or written information or advice given by the Company, its distributors, dealers or agents, shall increase the scope of this Limited Warranty or create any new warranties.

Geographical Limitation of Warranty—This limited warranty is valid only within the country in which the Product is purchased/licensed.

Limitations on Remedies—YOUR EXCLUSIVE REMEDIES, AND THE ENTIRE LIABILITY OF TELESTREAM, LLC WITH RESPECT TO THE PRODUCT, SHALL BE AS STATED IN THIS LIMITED WARRANTY. Your sole and exclusive remedy for any and all breaches of any Limited Warranty by the Company shall be the recovery of reasonable damages which, in the aggregate, shall not exceed the total amount of the combined license fee and purchase price paid by you for the Product.

Damages

TELESTREAM, LLC SHALL NOT BE LIABLE TO YOU FOR ANY DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF YOUR USE OR INABILITY TO USE THE PRODUCT, OR THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, EVEN IF THE COMPANY HAS BEEN ADVISED OF THE POSSIBILITY OF THOSE DAMAGES, OR ANY REMEDY PROVIDED FAILS OF ITS ESSENTIAL PURPOSE.

Further information regarding this limited warranty may be obtained by writing:
Telestream
848 Gold Flat Road
Nevada City, CA 95959 USA

You can call Telestream via telephone at (530) 470-1300.

Regulatory Compliance

Electromagnetic Emissions: FCC Class A, EN 55022 Class A, EN 61000-3-2/-3-3, CISPR 22 Class A

Electromagnetic Immunity: EN 55024/CISPR 24, (EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11)

Safety: CSA/EN/IEC/UL 60950-1 Compliant, UL or CSA Listed (USA and Canada), CE Marking (Europe)

California Best Management Practices Regulations for Perchlorate Materials:
This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. Perchlorate Material-special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate.

Guide Part number: 243096

Publication Date: March 2018

Contents

Copyrights and Trademark Notices 2

Introduction 13

What the Lightspeed Live Server Includes 13
Overview 14
Lightspeed Live Stream 14
Lightspeed Live Capture 15
Using Live Stream and Live Capture Concurrently 15
Shared Resource Allocation 15
Lightspeed Live Web API Reference 16
Lightspeed Live Server 17
System Power 18
Drives 18
Front Control Panel 18
Cooling System 18
SDI Input Cards 18
GPU 19
Expansion Input Card Slots 20
Front Panel 21
Front Panel Features 21
Rear Panel 22
Video Input Connections 23

Server Installation and Maintenance 25

Installing the Server 26
Unpacking 26
Rack Installation 27
Assembling the Rails 27
Installing Outer Rails into a Rack 28
Installing the Server in the Rack 29
Making Connections 30
Data and Signal Connections 30

Power Requirements and Connections 31
Power and General Cautions and Warnings 31
Operating System 33
Microsoft Activation Key 33
Microsoft Updates 33
Windows User ID and Password 33
Windows Firewall 33
Maintaining the Server 34
Performance Tuning a Lightspeed Live Server 34
Backing up the Lightspeed Live Server 35
Managing the Lightspeed Live Server 36
Installing New or Replacement Hard Drives 37
Rebuilding the Lightspeed Live Storage RAID 38
Replacing Power Supplies 38
Replacing the Power Supply 38
Monitoring Lightspeed Live via SNMP 39

Configuring and Updating Live Stream 41

Updating the Lightspeed Live Stream Software 42
Renaming a Lightspeed Live Stream Server 42
Joining Multiple Stream Servers 43
Making Registry Edits on the New Servers 43
Stopping and Restarting Telestream Live Services 45
Firewalls and Blocked Ports Limit Functionality 46
Using the Live Stream Web App with Multiple Servers 46
Create a UNC Path for the Resource Location 46

The Live Stream Web Application 47

Lightspeed Live Stream Web App Interface 48
Source and Channel Indicator Icons 49
Logging Into the Lightspeed Live Stream Web App 50
Username and Password 50
Multiple User Access to the Live Stream Web App 50
Close Instances of the Live Stream Web App when Not in Use 50
Accessing the Lightspeed Live Guide and Web API Reference 51
Lightspeed Live Web API Reference 51
Activating a License 52
Offline License Activation 52
Deactivating a License 54
Live Stream Web App Overview 55
Components of the Live Stream Web App 55
Component Relationships 55
Sources 56
Programs 56
Encoders 57
Packages 57

Channels 57
Configuration Order for Setting Up Live Stream 58
Operation Flow through Live Stream Components 59
Exporting and Importing Settings 60
Configuring the Lightspeed Live Stream Web App 61
Editing General Settings 62
Configuring Sources 65
Configuring an SDI Source 65
Configuring a File Loop Source 67
Configuring a Slate Source 68
Configuring a Transport Stream Source 69
Configuring an RTMP Source 71
Configuring Audio Tracks 72
Adding Text Tracks for 608 and 708 Captions 73
Configuring Programs 74
Adding a Rendition 76
Adding a Segment 77
Adding Materials 77
Setting Trigger Conditions 82
Stacking Order Determines which Segment is Primary 84
Configuring Encoders 85
Stream Presets for Encoders 85
Adjusting GOP Settings 86
AAC Audio Encoder Group 87
AC3 Audio Encoder Group 88
AVC Video Encoder Group 89
HEVC Video Encoder Group 91
YouTube Live Encoder Settings 94
Facebook Live Encoder Settings 95
Periscope Encoder Settings 95
Configuring Packages 96
Apple HLS Packages 97
ATS (Adaptive Transport Stream) 99
DASH Packages 100
CMAF Packages 102
RTMP Packages 103
RTMP Azure Packages 104
MP4 Packages 105
YouTube Live Packages 105
Facebook Live Packages 106
Periscope Packages 106
Adding and Configuring Variants 108
Configuring Channels 109
Channel Controls 109
Channel Configuration 110
Output Location Options 111
HLS Stream Playback 114
RTMP Channel Configuration 115

RTMP Playback URLs for Akamai 116
YouTube Live Channel Configuration 116
Facebook Live Channel Configuration 116
Periscope/Twitter Channel Configuration 116
Selecting the Input Source for a Segment 117
Multiple Renditions or Segments 117
Scheduling Channel Activation Events 118
Clock Icon Indicates a Schedule for that Channel 118
Starting and Stopping a Channel 120
Previewing the Output of the Channel 121
Activated Channel Operation 122

Creating Stream Channels 123

Creating a YouTube Live Stream Channel 124
Sending Multiple Streams to YouTube from One Channel 128
RTMP Stream to YouTube 129
Creating a Facebook Live Stream Channel 130
Changing Facebook App Privacy Settings 130
Configuring the Live Stream to Facebook 130
Using the Same Channel to Stream Again to Facebook 134
Sending Multiple Streams to Facebook from One Channel 134
Hiding or Deleting a Video on Your Facebook Timeline 135
Revealing a Hidden Video 135
Creating a Periscope Live Stream Channel 136
Using Live Captioning Input via IP 140
Accessing the Captioning Preview 140
Channel Time Delay and IP Port Settings 140
Frame Rates for Live Captioning 140
Using CaptionMaker for Live Caption Input 140
Live Stream CPU and GPU Resource Usage Guide 141
Video Encoders 141
Video Compressor 141
Video Processor 141
Image Overlay 142
How Settings Affect Resources 142
Create Package Variants that have Efficient Resource Usage 142
Warnings for Full Queue and Dropping Frames 143
Full Queue Messages 143
Dropping Frames Messages 143
Supported Live Stream Source Input Formats 144
SDI 144
IP 144
Content File Sources 144

Appendix: Support 145

Obtaining Support | Information | Assistance 146

Locating the Live Stream Service Tag 147
Log Files for Live Stream 148
Downloading the Stream Log Files 148
Changing Log Content Settings 149
Return Material Authorization (RMA) Procedure 149

Introduction

This chapter presents an overview of Telestream's Lightspeed Live Capture and Lightspeed Live Stream products as well as the Lightspeed Live server hardware platform they share.

This chapter covers the following topics:

- What the Lightspeed Live Server Includes
- Overview
- Lightspeed Live Stream
- Lightspeed Live Capture
- Using Live Stream and Live Capture Concurrently
- Lightspeed Live Server

What the Lightspeed Live Server Includes

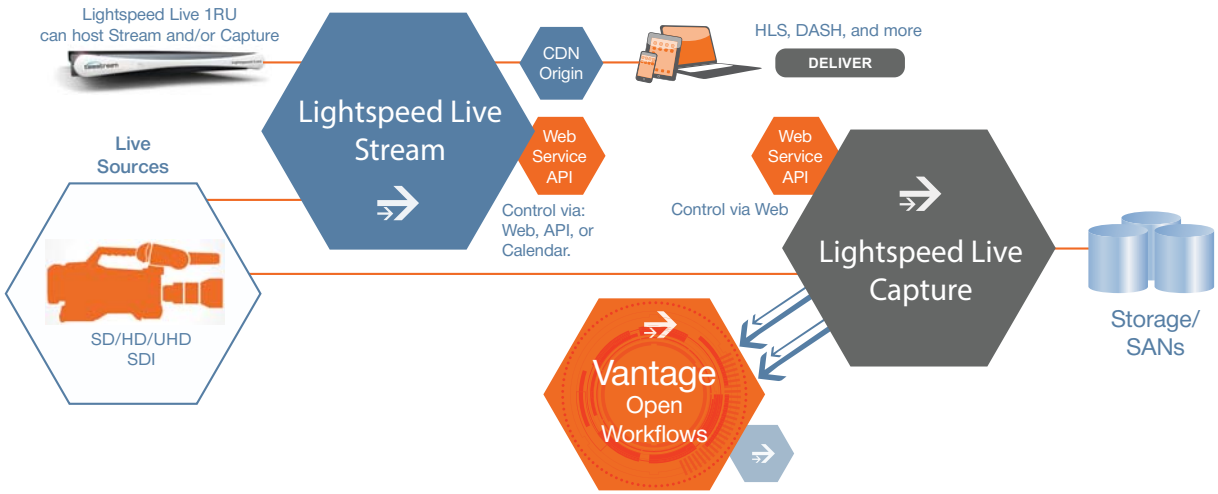
The Lightspeed Live server is a high-speed, high-capacity, real-time media processing server with these main components installed or included:

- Windows 2012 R2 Operating System
- GPU
- Standard SDI input card
- Vantage media processing software (installed when configured as Live Capture appliance)
- Lightspeed Live Capture web application (installed when configured as Live Capture appliance)
- Lightspeed Live Stream web application (installed when configured as Live Stream appliance)
- Documentation in applications and on flash drive (optional DVD by request). The most up-to-date versions are available on the Telestream web site
- Accessories (rack rails, BNC adapters)

Additional details and specifications are included in this chapter.

Overview

Lightspeed Live Stream and Lightspeed Live Capture are two separate applications that run on a Lightspeed Live server to deliver real-time, enterprise-class live streaming for media and entertainment companies, corporations, government agencies, and educational facilities. Lightspeed Live Stream solves the problem of preparing real time content for adaptive bitrate live streaming, while Lightspeed Live Capture can independently record multiple channels of SD, HD, or a single channel of UHD.



Lightspeed Live Stream

Lightspeed Live Stream encodes a live program at highest quality and simultaneously streams the output via an origin server or content delivery network (CDN). Lightspeed Live Stream can be deployed as a stand-alone solution for live multi-screen services or combined with the Vantage Media Processing Platform via the optional Lightspeed Live Capture product.

Lightspeed Live Stream can receive content via 3G baseband (SDI) as well as IP sources via 10Gb Ethernet. Output can be delivered via RTMP or as HTTP Live Streaming (HLS) and MPEG DASH packages at SD, HD, and UHD (in AVC and HEVC) resolutions. In parallel to generating the main streaming outputs, the system simultaneously creates a real-time, streaming proxy for each channel.

Note: The Lightspeed Live Stream product is a standalone appliance that runs exclusively on Lightspeed Live server hardware. All Live Stream software and background processes are completely independent of Vantage services, components or licensing. Lightspeed Live Stream is licensed directly through a license key supplied by the Telestream License Team. This license key applies to the Lightspeed Live Stream software only.

Lightspeed Live Capture

The Lightspeed Live Capture application can be installed on the same server as Lightspeed Live Stream to simultaneously capture the source video into Vantage for further processing. Until now, file-based and siloed systems required a serial workflow. By closely integrating parallel file-based open workflows with the combined CPU/GPU power of the Lightspeed Live server and applications, the fastest possible delivery of all assets is realized.

Lightspeed Live Capture, in addition to operating as a standalone capture system, can extend live encoding capability by providing live capture in a number of high quality mezzanine formats in the Vantage Media Processing Platform. Through this combination, users can simultaneously make use of both the real time streaming capability and the full range of video manipulation that Vantage offers.

Note: The Lightspeed Live Capture product is also a standalone appliance that runs exclusively on Lightspeed Live server hardware. Live Capture is built on the Vantage Media Processing Platform architecture. The Lightspeed Live Capture server ships with the following Vantage Services pre-installed: Live Service, Transport Service, Metric Service, and SDK Service. No other Vantage services can be installed or run on a Lightspeed Live server.

Individual Lightspeed Live Capture appliances can be joined together to create a multi-server capture farm or joined to an existing Vantage domain allowing Live Capture server(s) to be seamlessly integrated into Vantage workflows. Live Capture servers use the Vantage Media Processing Platform licensing mechanism allowing Live Capture and Vantage to coexist in a single domain.

Using Live Stream and Live Capture Concurrently

A Lightspeed Live server can host either Lightspeed Live Capture or Lightspeed Live Stream, or both applications simultaneously. Although both applications can operate stand-alone, the greatest benefits are realized when coupled to Telestream's Vantage platform for complete workflow orchestration. Users can concurrently stream, capture and process live content for consumption on a wide variety of platforms.

Note: The Lightspeed Live Stream and Live Capture applications can reside and fully function together on a single Lightspeed Live server. Each application is licensed independently as described in the previous topics.

Shared Resource Allocation

Since Live Capture and Live Stream use shared operating resources, care is needed to avoid over subscription of CPU, GPU, memory, and other resources. Source content coming through the Lightspeed Live server inputs can be used by both Live Capture and Live Stream. See Live Stream CPU and GPU Resource Usage Guide for information about creating efficient Live Stream channels and see "*Lightspeed Live Capture Resource*

Calculator" in the *Lightspeed Live Capture User Guide* for details on calculating Live Capture resource usage.

Lightspeed Live Web API Reference

The Lightspeed Live Web API Reference enables custom programs to remotely control the operation of the Live Capture and Live Stream services.

To access the Live Stream Web API Reference, click the three-dot icon in the upper right of the Live Stream web application, select the **About** menu and click **Web API Reference** to open the PDF document.

Lightspeed Live Server

The Lightspeed Live server is a high speed, high-end Windows server configured specially for streaming and capturing live video using a pre-installed SDI input card and Telestream Vantage with the Lightspeed Live Stream and Lightspeed Live Capture web applications.

The following table summarizes the Lightspeed Live server hardware details, followed by more detailed descriptions of the components.

Lightspeed Live server Hardware Details:

Components	Description
RAM	64 GB
CPU	Dual Multi-Core CPUs
GPU	1 GPU card
OS Drives	1 SATA SSD drive for Windows OS (top right-most slot) 1 optional second OS SSD drive (bottom right-most slot)
Storage Drives	4 RAID 5 SAS hard drives, 1.2TB per drive, 10k RPM 4 additional optional SAS drive bays
SAS Controller	Supports up to 8 SAS3 media drives
Available PCI Option Slot	1 half height PCI x8 slot (all other slots taken)
Capture and Stream Hardware	1 standard 4-input SD/HD/3G-SDI input card, uses 1 full height PCI slot.
Video Inputs	Standard: 4 video plus 1 LTC mini-BNC inputs Optional: 4 video plus 1 LTC standard BNC inputs
USB 3.0	2 front, 2 back
Ethernet	Four 10-GB
VGA Monitor	1 VGA monitor port
AC Inputs	2 redundant AC inputs, 100-240 Volts, 4.5-9.5 Amps, 50-60 Hz.
RS422 for VTR (optional)	4-Port RS422 VTR Interface (Live Capture only).
Operating Environment	10 degrees C to 35 degrees C, 8-90 percent humidity (non-condensing)

System Power

The chassis features redundant hot-swappable dual digital power supplies that automatically sense the input voltage between 100v to 240v, and operate at that voltage. Power cords plug directly into the power supply units at the back of the chassis, and the Power On/Off (0/1) button on the front energizes the unit. A green light indicates that the power supply is operating. When a power supply fails or is disconnected, an amber light on the power supply illuminates and an alarm sounds.

Drives

The chassis supports up to eight SAS hot-swappable 2.5" media hard disk drives. The eight drive bays on the left (viewed from the front) support SAS3 media drives, four of which are included as standard. These eight storage drives can be configured for RAID 0, 1, 5 or 10 (RAID 5 set at the factory). The two additional bays on the right support only SSD/SATA drives. The top right bay is reserved for the Windows OS drive, and the bay below it is available.

When replacing or adding hard drives, replace with these drives or equivalent:

- HGST Ultrastar C10K1800 2.5-inch SAS, helium drive
- 1.2 TB capacity, 10K RPM
- 128MB cache buffer, 12Gb/s data rate
- MTBF 2.0M hours
- Error rate 1 in 10^{16}

Front Control Panel

The chassis front control panel provides system monitoring lights and control buttons which are described later (see *Front Panel*).

Cooling System

The system cooling design features eight 4-cm counter-rotating fans located in the middle section of the chassis. Fan speed is controlled by the IPMI system management software to respond to fluctuations in system temperature.

Dual air shrouds direct air flow to the dual CPUs and components that require cooling. The power supply module also includes a cooling fan.

SDI Input Cards

The standard (or optional HEVC; supported by Live Stream only) SDI input card is installed in the Lightspeed Live server's lower right PCI card slot and provides four SD/HD/3G-SDI serial digital (SDI) inputs allowing for 4 independent SD/HD/3G SDI signals or 1 UHD/4K signal. Additionally one Longitudinal Timecode (LTC) input is provided for use across all input signals.

For the standard card each input consists of a mini-BNC connector and can be converted to standard BNC with the included mini-standard BNC converter cables.

Note: For 4K and Ultra HD, four BNCs are used together to provide one 4K or Ultra HD input. The 4K/UHD signal should be connected to all four BNC inputs. All other resolutions use one BNC per input.

Input Reference

- *SD/HD*—For SD/HD, reference is derived from an internal free-run clock on each 3G-SDI input.
- *UHD/4K*—For UHD/4K, reference is derived from an internal free-run clock on the number 1 3G-SDI input (SDI Input #1).

Supported SDI card input formats:

4K	**23.98**	**24**	**25**	**29.97**	**30**	**50**	**59.94**	**60**
4096 x 2160p	x	x	x	x	x	x	x	x
Ultra HD	**23.98**	**24**	**25**	**29.97**	**30**	**50**	**59.94**	**60**
3840 x 2160p	x	x	x	x	x	x	x	x
HD	**23.98**	**24**	**25**	**29.97**	**30**	**50**	**59.94**	**60**
1080i			x	x	x			
1080PsF	x	x	x	x	x			
1080p	x	x	x	x	x	x	x	x
720p						x	x	x
SD	**23.98**	**24**	**25**	**29.97**	**30**	**50**	**59.94**	**60**
625i - PAL			x					
525i - NTSC				x				
Audio								
16-Channel 24-bit Little Endian SDI embedded, 48 kHz synchronous								

Note: All 16 channels of audio for UHD/4K are provided on SDI Input #1.

Note: Sources in the YCbCr 444 or RGB 444 color space are not supported. Only the YUV 422 color space is supported.

GPU

The GPU in the Lightspeed Live server accelerates video processing, and H.264/H.265 media creation. Using the GPU in combination with Lightspeed Live's powerful dual CPU processors enables the creation of streaming and captured media from multiple live input sources.

Expansion Input Card Slots

The system supports one optional low profile PCI card, installed by Telestream.

In order to ensure optimal product performance and warranty coverage, it is important that Telestream products be used in accordance with the following product policy. It is critical that our product policy be adhered to when using add-in cards:

- Add-in card(s) are to be installed by Telestream, or an authorized agent, at or before commissioning.
- Only Telestream-qualified add-in cards can be used. For the most up-to-date list refer to the Lightspeed Live Server product sheet on the Telestream.net web site. Using untested and unknown add-in cards voids the product warranty.

Note: Except for externally removable power supplies and disk drives, the Lightspeed Live server has no user-serviceable parts. To maintain your warranty, any repair or additional PCI card installation and any service inside the sealed top cover must be performed by Telestream or an authorized Telestream service technician.

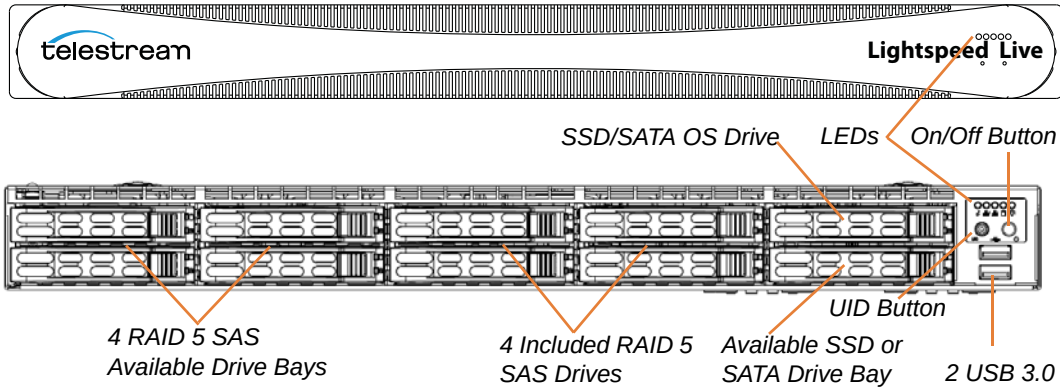
Front Panel

The Lightspeed Live server has a removable front bezel. By removing the bezel, you can access the system interface buttons and LEDs, drives, and 2 front USB ports.

Front Panel Features

The removable front bezel provides visibility of the system monitoring LED indicators and allows pinhole access to the recessed UID and power buttons.

Lightspeed Server Front Bezel:



LEDs (left to right)

- System Overheat | FAN Fail | UID
- Network Activity (NIC1)
- Network Activity (NIC2)
- Hard Drive Activity
- Power

UID Button (left)

The UID button alternately turns on and off the blue front and rear panel UID LEDs used to locate a particular unit among many units in a rack or server room.

Power On/Off Button (right)

Press the Power On/Off button to perform a normal power up/power down cycle or a hardware reboot (hold the button down for 4 seconds). A reboot abnormally terminates connected clients and systems and should be done only in the event of an unrecoverable system error. Under normal conditions, you should properly close client programs and shut down the domain and OS before cycling power.

USB Ports

Two USB 3.0 ports for general use are located below the LEDs and buttons.

Drives

The top right-most drive bay houses the SSD/SATA Windows OS drive, and the drive beneath it is an available SATA drive bay. These drives have their own controller, separate from the storage drives.

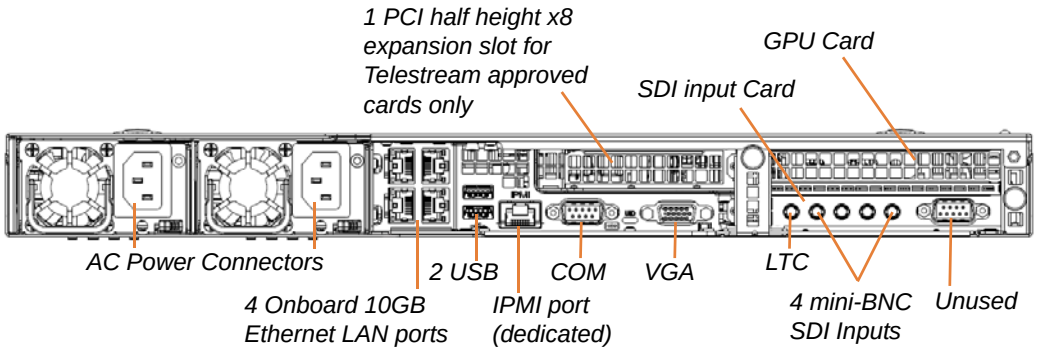
To the left of the OS drive are 8 SAS media storage drive slots containing the 4 standard and 4 optional media drives. These drives are configured for RAID 5 and have their own controller separate from the OS drive.

Rear Panel

These are the rear panel ports and connectors:

- *2 redundant AC power connectors*—connect to a 10-amp or greater AC source
- *4 10GbT Ethernet LAN ports*—connect as required to Ethernet LAN
- *2 USB 3.0 ports*—connect as required to keyboard, mouse, or other serial device
- 1 IPMI Ethernet dedicated port that should not used for any other purpose
- 1 VGA monitor port
- 1 COM control port (not used)
- 4 3G-SDI inputs
- 1 LTC input

Lightspeed Live server Rear Panel:



Additional PCI cards can be optionally installed by Telestream in the PCI expansion slots.

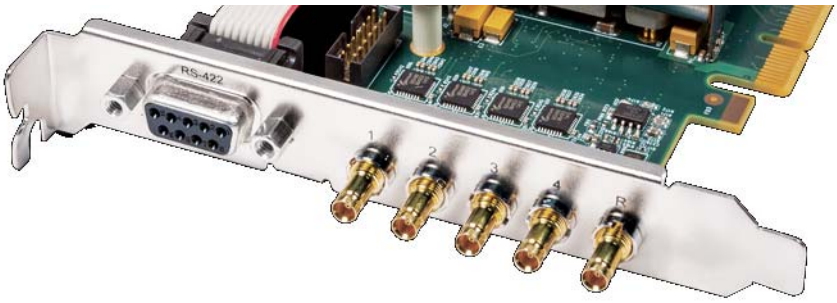
Video Input Connections

The Lightspeed Live server includes an installed standard SDI input card (included) or an optional HEVC SDI input card in the lower right PCI slot. For a complete list of video formats, see the SDI Input Cards.

Standard SDI Input Card

The standard SDI input card contains 5 miniature BNC video input connectors with 5 adapter cables to convert to full-size BNC connectors:

- **SDI Inputs 1-4:** SD/HD/3G x 1080/4K video formats; audio 16-Channel, 24-bit SDI embedded, 48 kHz synchronous
- **Input R:** LTC timecode input



Optional HEVC SDI Input Card (Supported by Live Stream only)

The HEVC option card replaces the standard SDI input card and contains 5 full-sized BNC video input connectors:

- **SDI Inputs:** SD/HD/3G x 1080/4K video formats; audio 16-Channel, 24-bit SDI embedded, 48 kHz synchronous
- **LTC Timecode Input:** The BNC connector on the bottom of the board. On the far right in the picture below

Server Installation and Maintenance

This chapter explains how to install the Lightspeed Live server into an equipment rack and configure it for operation.

This chapter covers the following topics:

- Installing the Server
- Making Connections
- Operating System
- Maintaining the Server
- Monitoring Lightspeed Live via SNMP

Installing the Server

The following topics cover physical server installation:

- Unpacking
- Rack Installation

WARNING: *Only trained and qualified personnel should be allowed to install, replace, or service this equipment.*

CAUTION: Except for replaceable power supplies and hard drives which may be accessed from the outside, the Lightspeed Live server is a sealed device, with no user-serviceable parts or user-accessible expansion slots. You should never open the top cover or attempt to upgrade or alter the server. Doing so exposes you to electrical hazard, may damage the unit, and may invalidate your warranty. If you have hardware or software problems with your Lightspeed Live server, follow the steps in Obtaining Support | Information | Assistance in Appendix B of this guide to obtain service.

Note: Before proceeding, work with your network administrator to determine computer and network setting requirements.

Unpacking

The Lightspeed Live server arrives packed in a heavy duty cardboard box with foam padding surrounding the device to protect it. During unpacking, inspect the container and the contents for damage. If there is any damage, report it immediately to the freight carrier and to Telestream Support.

The server is heavy. Unpack the server on a strong, well-balanced table that can support the full weight of the server and shipping container without tipping.

Inside the box, you will find the server, optional components such as rack rails, five mini BNC to standard BNC cables, and documentation on paper and flash drive (a DVD is available by request).

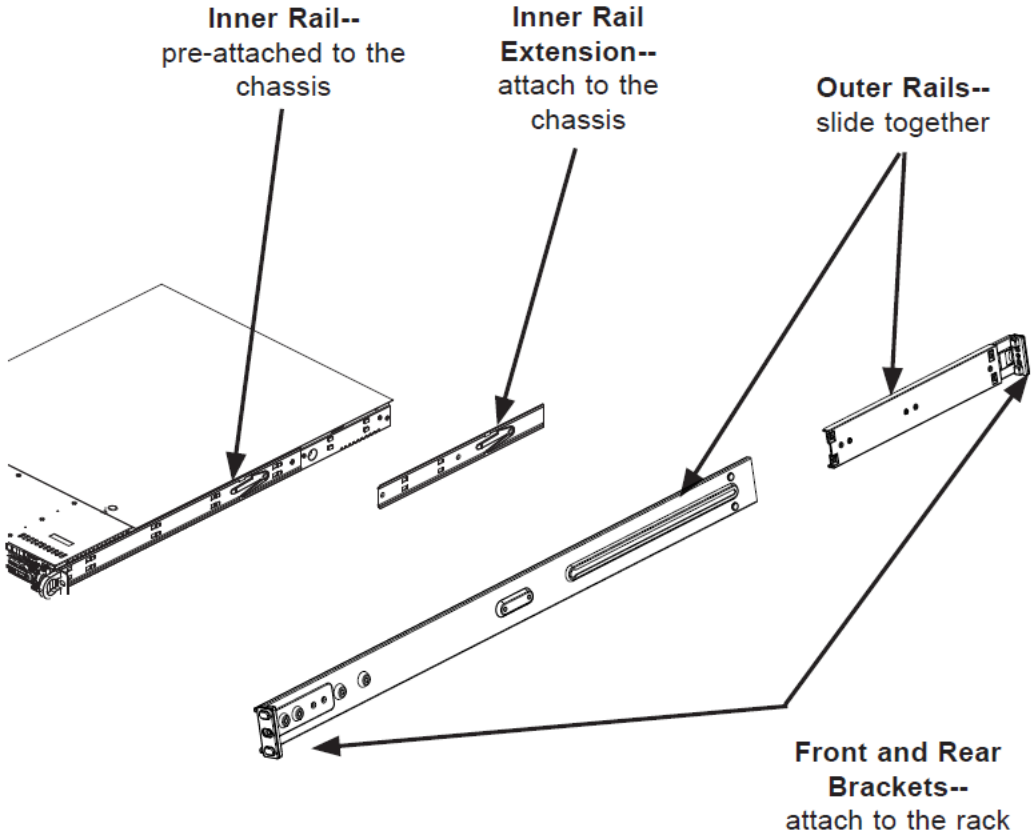
Rack Installation

The Lightspeed Live server is designed to fit into a standard 19-inch (483 mm) equipment rack with support front and rear, using supplied rack rails and rear support extensions.

Assembling the Rails

The inner rail extensions install on each side of the chassis as shown. Align the extension's holes with the hooks on the side rail and slide the extension forward to engage the hooks until the quick release bracket snaps into place. For added stability, you can secure the extension with a screw.

The outer rails assemble by sliding the front and rear sections together as shown.



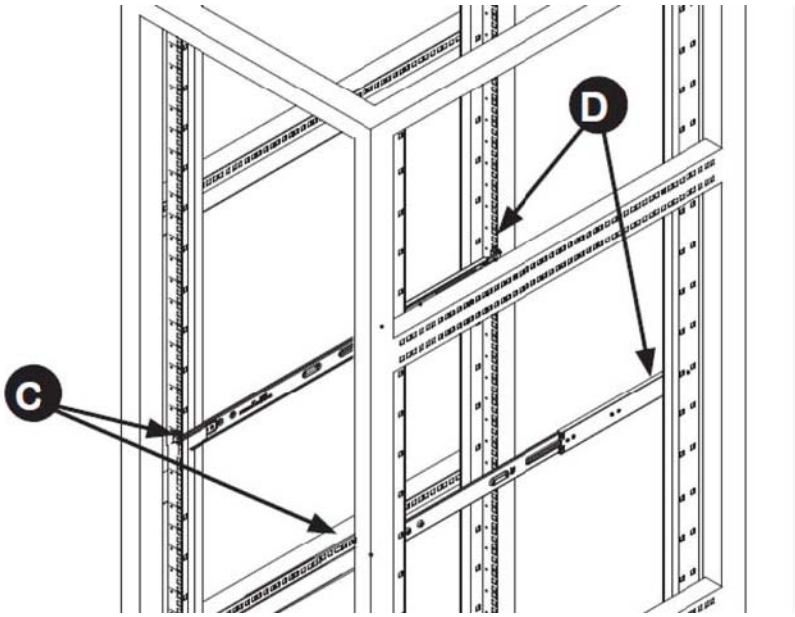
Installing Outer Rails into a Rack

Next, install the outer rails into the rack as shown in the next figure. Align the square pegs on the front of the rail with the square holes in the front of the rack (C).

Push the rail into the rack until the quick release bracket snaps into place, securing the rail to the rack.

Extend the rear of the rail to align its square pegs with the square holes on the rear of the rack (D). Push the rail into the rack until the quick release bracket snaps into place, securing the rail to the rack.

CAUTION: To prevent the server chassis from falling and becoming damaged, be sure the rails are solidly in position and ready to support the full weight of the chassis.



Installing the Server in the Rack

When selecting a position in a rack to place the server, be sure to allow a minimum of 30 inches of clearance at the back of the server for sufficient cooling airflow and servicing.

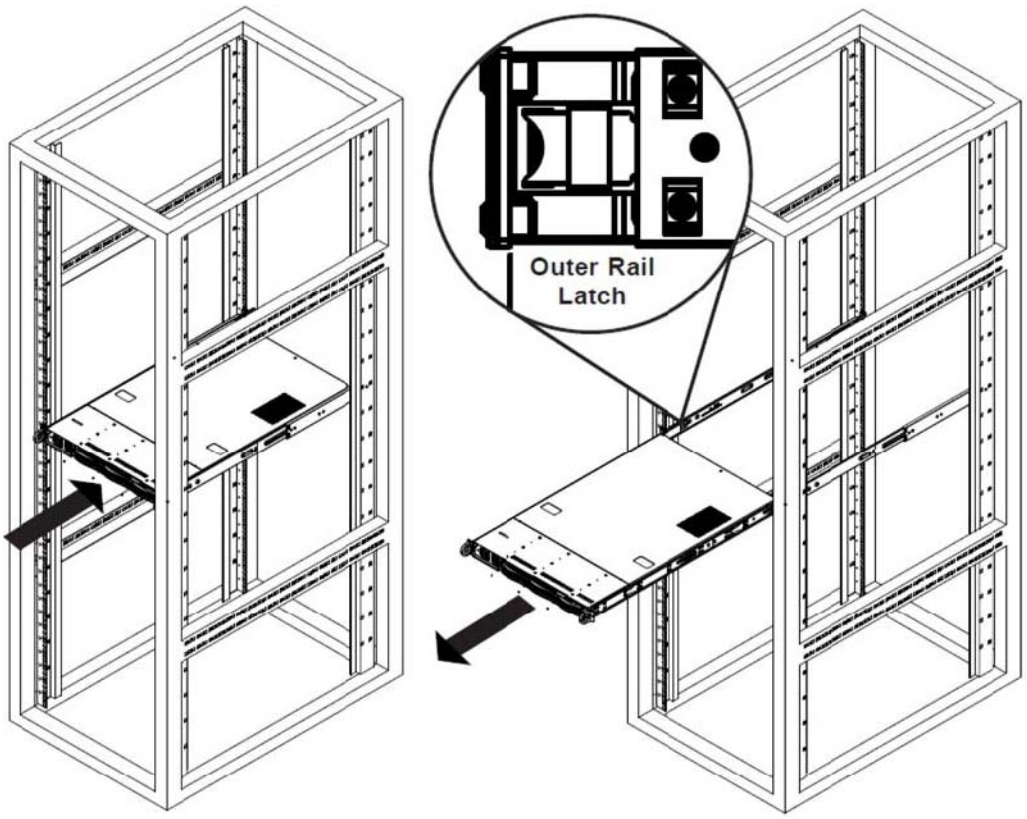
To install the server, follow this procedure:

Slide the inner rail extensions forward into the front of the outer rails.

Support the chassis and align the back of the chassis with the front of the rails.

Push the chassis backward, sliding it into the rack rails, until the chassis clicks into the locked position.

CAUTION: To prevent the server from falling and becoming damaged, be sure it is securely in the rack before you remove support.



If you need to remove the server from the rack, press the outer rail latch shown in the figure to release the chassis.

Slide the chassis forward off the outer rails and out of the chassis.

Making Connections

This topic describes the server's connectors and how to connect to them. Follow the order of connections given here:

- Data and Signal Connections
- Power Requirements and Connections

Data and Signal Connections

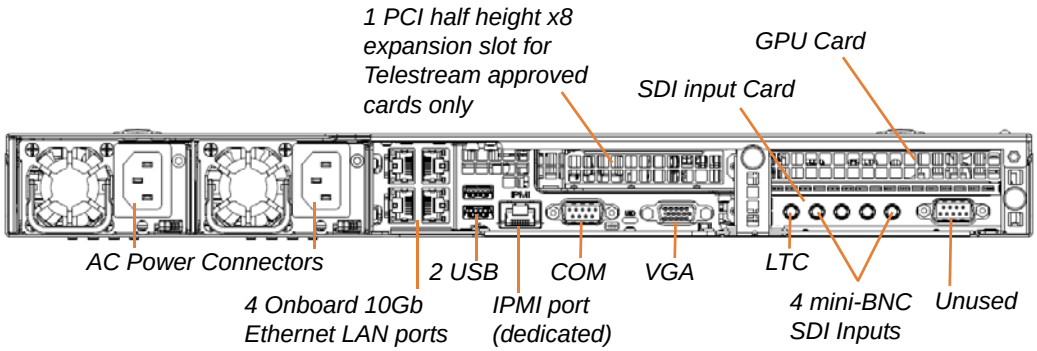
Make the following data and signal connections at the back of the server unit:

- Make Ethernet LAN connections to provide network connectivity.

Note: The Lightspeed Live Stream server can generate large amounts of network traffic when actively streaming. To prevent possible network issues, consult with your IT administrator to determine the best network configuration for your environment.

- Connect devices, such as a keyboard and mouse, to the USB connectors (optional).
- Connect a dedicated IPMI LAN to the IPMI port (optional).
- Connect a monitor to the VGA connector (optional).
- Connect SDI video sources to the connectors on the SDI input card using the supplied mini-to-BNC SDI cables.
- Connect a source of timecode (LTC) to the R (leftmost) BNC connector on the SDI input card.

Lightspeed Live server Rear Panel:



Power Requirements and Connections

After the server chassis has been physically installed and all other connections made, connect the two redundant AC power cords to the back of the chassis and to an AC power source. Be certain to observe the following AC power and connection requirements and all applicable electrical codes.

The Lightspeed Live server is rated at 100-240 VAC, 50-60 Hz, up to 10 amps. Take the following precautions to ensure a safe power connection:

- Make certain that the power source circuit can supply voltage within the specified range and current of at least 10 amps without becoming overloaded.
- Counted together, the server and other devices connected to the same power source must not exceed the total capacity of the power source circuit.
- To protect against circuit overload and overheating, ensure that the power source circuit includes a circuit breaker no greater than 250 Volts, 20 Amps.

When power is connected, press the Power On/Off (0/1) button on the front of the chassis to turn the server on. To turn power off at any time, press the Power On/Off button again.

Power and General Cautions and Warnings

Observe the following precautions when connecting power and operating the server.

WARNING: *Only trained and qualified personnel should be allowed to install, replace, or service this equipment.*

WARNING: *Hazardous voltage or energy is present on the backplane when the system is operating. To prevent possible injury or death, use caution when servicing.*

WARNING: *This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 250 Volts, 20 Amps.*

WARNING: *Ensure a proper earth ground connection to the ground conductor in the AC power plug. Failure to do so could present a severe electric shock hazard that could result in injury or death.*

CAUTION: Telestream recommends connecting computer equipment to AC power through an uninterruptible power supply (UPS) with surge protection. Fluctuations in commercial supply voltage can damage unprotected electronic equipment. A high quality surge suppressor may be substituted if a UPS is not available, but it may not provide adequate electrical spike protection.

WARNING: *When installing the product, use the provided or designated connection power cables. Using any other cables could cause a malfunction or a fire.*

WARNING: *The fans might still be turning when you remove the replaceable power supply from the chassis. Keep fingers, screwdrivers, and other objects away from the openings in the replaceable power supply's housing.*

WARNING: *Power supplies and other components can get very hot. Use caution when touching possibly hot components during operation and directly after unplugging.*

WARNING: *This unit has two power supply connections. Both connections must be removed to completely de-energize the unit.*

Operating System

Windows Server 2012 R2 (Standard 64-bit) is pre-installed on the Lightspeed Live server on an SSD drive. See microsoft.com for OS specifications.

Microsoft Activation Key

A sticker on the top surface of the Lightspeed Live server lists license numbers. The number listed as the Physical Key is the OEM license number for the Microsoft Windows operating system. If you remove and reinstall the OS, you will need to use this key to activate Windows again. The number typically contains five groups of five digits, as in this example: YFG8H-TDD97-6BR4G-F88PF-XXXXX. Enter the Physical Key shown on your sticker when activating Windows.

Microsoft Updates

The Lightspeed Live server ships with the Windows operating system set to check for updates, but it does not automatically download or install them. Downloading and installation of critical operating system updates is the responsibility of each customer (see your system administrator).

Windows User ID and Password

After the Lightspeed Live server boots up, you can log into it with the following Windows user account.

Lightspeed Server Windows User Account

User	*Administrator*
Password	*telestream!1*

Windows Firewall

The Lightspeed Live Capture web application uses port 8083 and/or 8084, and Live Stream uses port 8089. If you use Windows Firewall, be sure those ports are open on the Lightspeed Live server and across your network.

To open the Windows firewall on the Lightspeed Live server or other Windows machines, go to Start > Control Panel > Windows Firewall > Allow a program or feature through Windows Firewall > Allow another program.

Scroll through the list of programs, and click Add for each of these: Lightspeed Live Capture, Lightspeed Live Stream, Vantage Management Console, and Vantage Workflow Portal.

Click OK to close the programs list. The added programs appear in the firewall list, and you can check which networks they can use. Then close the Control Panel.

Maintaining the Server

The following section describes common server maintenance tasks that you may need to perform from time to time:

- Performance Tuning a Lightspeed Live Server
- Backing up the Lightspeed Live Server
- Managing the Lightspeed Live Server
- Installing New or Replacement Hard Drives
- Rebuilding the Lightspeed Live Storage RAID
- Replacing Power Supplies
- Monitoring Lightspeed Live via SNMP

Performance Tuning a Lightspeed Live Server

The following settings are made at the factory to ensure best performance of your Lightspeed Live server. The settings are supplied here in the event they have been changed and you need to restore them to factory original settings. (For details, consult your System Administrator or a Telestream Field Sales Engineer).

1. In Performance Options, set Windows Performance options:
   - Navigate *to* Start > Control Panel > System > Advanced system settings > Settings > Advanced.
   - Select *Background services* for Vantage transcoding nodes and SQL nodes.
   - Select *Programs* for editorial systems and Vantage client applications that are not running other Vantage services.
2. In Performance Options, Data Execution Prevention tab:
   - Select *Turn on* (select) *Data Execution Prevention (DEP) for essential Windows programs and services only*.
3. Set User Account Control (UAC) (in Start > Control Panel > User Accounts > Change User Account Control Settings) as low as safely possible, considering your exposure to Internet viruses and malware.
4. Set Power Options to High Performance with Sleep disabled:
   - Navigate to Start > Control Panel > Power Options.
   - Select the *High Performance* plan.
   - Set Sleep mode to *Never* (never sleep).
   - Select *Change advanced power settings*, and set all critical functions so that they are always ON (this usually means setting them to *Never* turn OFF).

5. Disable (turn OFF) any real-time software applications and processes, such as the following, that could adversely affect disk I/O performance or use excessive CPU:
   - Real-time virus scanning of media files as they are being captured
   - Automatic software updates that can preempt real-time services
   - Real-time file indexing
6. Disable all unnecessary Windows services in the Start > Control Panel > Administrative Tools > Services (consult your System Administrator).
7. Turn OFF all firewalls (including third party firewalls) and packet filtering, which may cause unpredictable performance:
   - Set Start > Control Panel > Windows Firewall > *Turn off Windows Firewall*.

   If you choose to use firewalls, open them for the applications installed on the Lightspeed Live server.
8. You may increase network throughput by increasing buffer size within your network adapter. Set your Network Adapter's transmit and receive buffers to 1024:
   - Start > Control Panel > Network and Sharing > Change Adapter Settings > Local Area Connection > Properties
9. Disable any screen savers in Start > Control Panel > Display > Screen Savers.
10. Disable disk indexing in Start > Computer. Right-click each disk and uncheck *Allow files on this drive to have contents indexed in addition to file properties*.

Backing up the Lightspeed Live Server

In order to protect your Lightspeed Live server from data loss, Telestream highly recommends that you create an image of the Operating System drive (C:\) drive immediately upon taking delivery of your server and that you perform periodic back-ups of all critical data on the server.

Several disk image software solutions are available for creating a restoration image that you can use to restore the Lightspeed Live server's operating system drive (C:\) to its original state. Using software solutions such as these, along with regular backups, you can restore your server back to its original shipping state with all of your critical data:

- Norton Ghost
- Clonezilla

Consult your IT/Systems administrator for details on creating restoration images and performing a periodic backup of your Lightspeed's critical data.

Managing the Lightspeed Live Server

IPMI View management software provides remote network management of one or more Lightspeed or Lightspeed Live servers using IPMI messages over Ethernet LAN or a dedicated IPMI LAN. If your Lightspeed Ethernet connectors are used to connect to storage, you can use the IPMI LAN connector to create an IPMI network among your Lightspeed servers.

You can download IPMI View from this location:
ftp://ftp.supermicro.com/utility/IPMIView/.

You'll find the IPMI View User's Guide at this location:
ftp://ftp.supermicro.com/utility/IPMIView/IPMIView20.pdf

Among the tasks you can perform using IPMI View are these (see the IPMI View User's Guide for details):

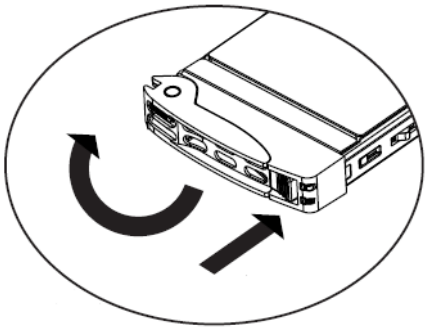
- Discover Lightspeed Servers on the IPMI network (requires dedicated IPMI LAN)
- View system event logs
- Check current sensors and monitor history of fans, voltages, temperature, and power supplies
- View firmware revision levels
- Perform various kinds of shutdowns and resets
- Blink the UID LED to locate a particular unit in the rack or server room
- Set fan speed
- Manage LAN configuration, SNMP configuration, and RS232 modem
- Manage users, passwords, and privileges
- Set up paging of users in the event of malfunctions
- Establish Text Console Redirection or KVM Console Video Redirection for remote system control via text display or full graphic display
- Access virtual media
- Set up server management groups
- Update firmware

For detailed instructions about using any of these system management features, consult the *IPMI View User's Guide*.

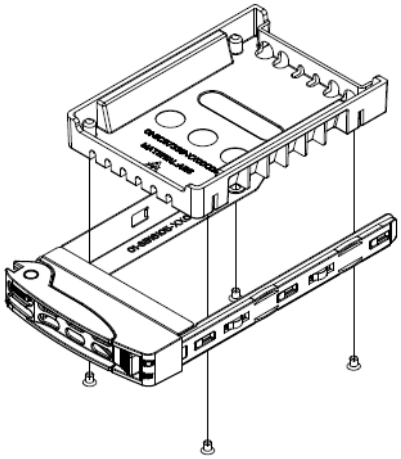
Installing New or Replacement Hard Drives

Follow these steps to replace a failing hard drive or install a new one. Drives may be removed or replaced with power on. See the Drives topic in the Introduction chapter for new or replacement drive specifications.

1. Remove the front bezel from the chassis.
2. Press the release button on the right front of the drive carrier.
3. Use the drive carrier handle to pull the carrier out of the chassis.



4. Remove the drive or dummy drive from the carrier by removing the four M3 screws from the underside of the carrier. Retain the screws.
5. Insert the new drive into the carrier with the PCB side down and the connector facing the back of the carrier.
6. Secure the drive to the carrier with the four M3 screws retained from removal. Gently tighten but do not over tighten the screws, which could cause damage.



7. Slide the drive carrier into its bay with the drive facing up until the drive seats firmly in the rear connector.
8. Push the carrier handle closed flat against the front of the carrier to secure the carrier and drive in place.
9. Replace the front bezel on the chassis, and go to the next topic to rebuild the RAID.

Rebuilding the Lightspeed Live Storage RAID

The MegaRAID Storage Manager software on the Lightspeed Live server enables you to rebuild the storage RAID if necessary, such as when you add a new drive, or want to change drive configurations. The MegaRAID Storage Manager is located at:

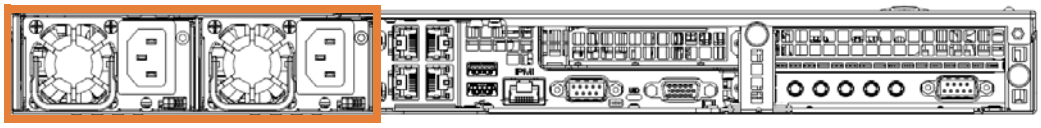
```
C:\Program Files (x86)\MegaRAID Storage Manager
```

In the MegaRAID Storage Manager folder, locate the **startupui.bat** file and double-click it to start the application. In the initial application panel, click on the server you want to work with, then enter your credentials to log in. The MegaRAID Storage Manager application opens.

Replacing Power Supplies

The Lightspeed Live server includes two redundant, hot-pluggable power supply modules. They automatically sense the input voltage between 100v to 240v, and operate at that voltage. Power cords plug directly into the power supply units at the back of the chassis. A green light indicates that the power supply is operating. When a power supply fails or loses power, an amber light on the power supply illuminates and an alarm sounds.

If either of the power supply modules fail, the other module will support the full load and will allow the system to continue operation without interruption. The PWR Fail LED will illuminate and remain on until the failed unit has been replaced. Replace with the same model. Replacement units can be ordered from Telestream. See Obtaining Support | Information | Assistance.



Replacing the Power Supply

1. Unplug the AC power cord from the failed power supply module.
2. Push in the locking tab at the back of the module to release it.
3. Pull the unit straight out of the chassis.

CAUTION: the power supply may be very hot when first unplugged and could cause burns. Handle carefully by the edges and do not touch hot components.

---

4. Insert the new unit into the chassis, pushing it in until it clicks firmly in place.
5. Reconnect the power cord.

Monitoring Lightspeed Live via SNMP

Management Information Base (MIB) files are provided for those organizations wanting to manage their Lightspeed Live servers via SNMP.

MIB files can be found on the Lightspeed Live server in this location:

C:\Program Files\Telestream\Live Stream Server

MIB files can also be found on the Lightspeed Live DVD or USB thumb-drive in the SNMP folder.

Configuring and Updating Live Stream

This chapter explains how to update the Lightspeed Live Stream software, how to join multiple servers, and how to rename servers.

This chapter covers the following topics:

- Updating the Lightspeed Live Stream Software
- Renaming a Lightspeed Live Stream Server
- Joining Multiple Stream Servers

Updating the Lightspeed Live Stream Software

All Lightspeed Live servers have the Lightspeed Live Stream software installed on them. Before using Lightspeed Live Stream, or when it's time to update the Lightspeed Live Stream software, contact Telestream support to obtain the correct installer for your server.

WARNING: Do not uninstall the Lightspeed Live Stream application if you are using Live Capture. Components of the Live Stream application are required in order for Capture to operate properly.

Renaming a Lightspeed Live Stream Server

A Lightspeed Live server that is used for Live Stream can be renamed in the usual method prescribed for Windows servers. The updated name(s) will display in the Live Stream web application.

When you want to rename a server that is also used for Live Capture, follow the procedure described in *"Renaming a Lightspeed Live Capture Server"* in the *Lightspeed Live Capture User Guide*. When this procedure is followed, the updated name(s) will display in the Live Stream web application.

Joining Multiple Stream Servers

A Lightspeed Live Stream server is factory-configured with all required Stream software and Services. Multiple Lightspeed Live servers can be joined together as a group to expand capabilities. The process of joining Lightspeed Live servers together requires making some registry setting changes on the new servers that will be joining the Primary server, and restarting some services. Even if you have joined servers together to use Live Capture, you need to also perform the process described here to use multiple servers for Live Stream.

Making Registry Edits on the New Servers

Make registry edits on each new Lightspeed Live server that you want to join to the Primary Lightspeed Live server.

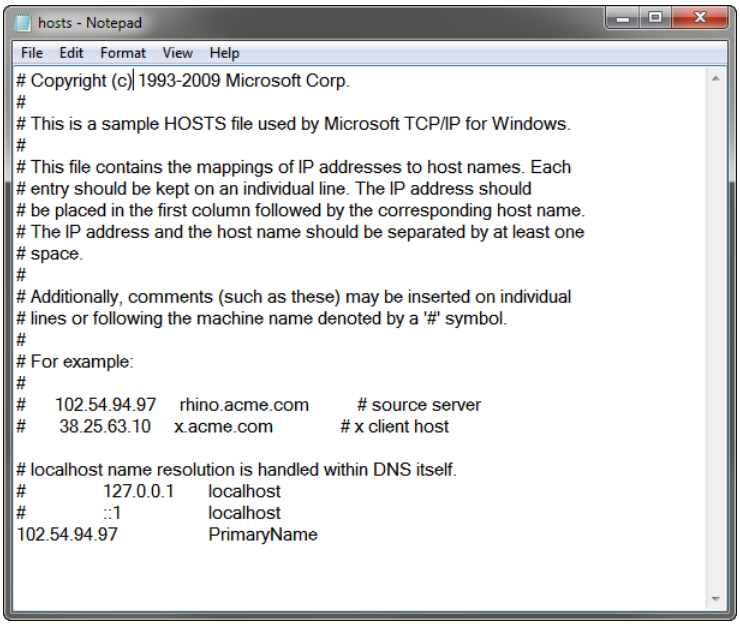
Follow these steps to validate and make registry edits on each new server:

1. Make sure that all Lightspeed Live servers have the same build on them, that they are turned on, and are not streaming any video content.
2. Make sure that all Lightspeed Live servers have proper network connectivity. See Data and Signal Connections for more information.
3. Log into one of the new Lightspeed Live servers.
4. The *hosts* text file on the new server needs to be edited to add the IP address and name of the Primary server.
   a. Open the *hosts* file with a text editor. The file is located at:

   C:\windows\system32\drivers\etc\hosts

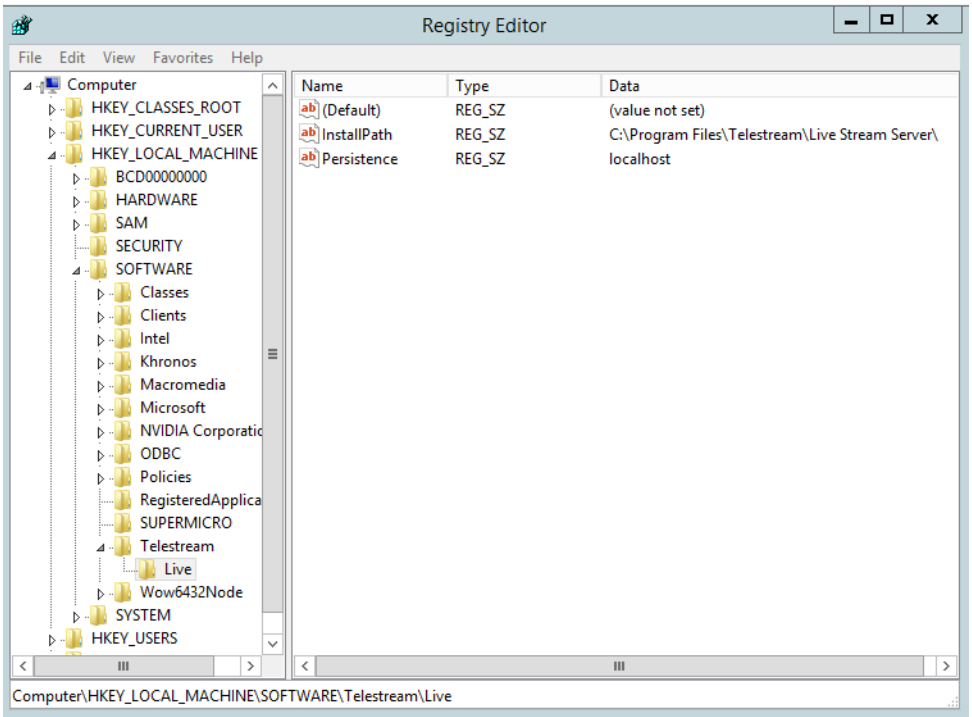
   b. Add the IP address and name of the Primary server to the *hosts* file, and save it. The *hosts* file, shown below, contains this example of what to add:

   102.54.94.97 PrimaryName

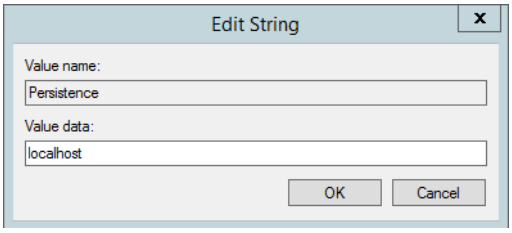


5. Open the Registry Editor.
   a. Type *regedit* in the search field of the Start menu.
   b. Regedit.exe will appear and be selected. Press Enter, or click on the Regedit.exe name to open it.
6. Navigate to this location in your Registry Editor and select it:

   HKEY_LOCAL_MACHINE\SOFTWARE\Telestream\Live



7. Change the Persistence data entry to the name of the Primary server.
   a. Double-click Persistence to open the Edit String dialog.
   b. Change localhost to the name of the Primary server, and click OK.



8. Close the Registry Editor.
9. Repeat steps 3 through 8, above, for each new server (don't edit the registry of the Primary server).

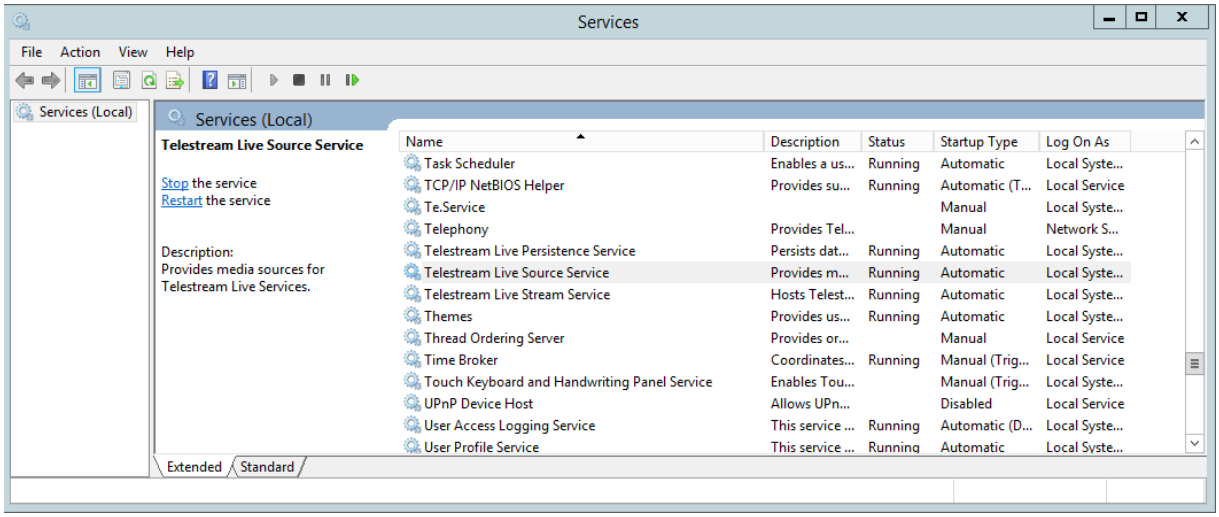
Stopping and Restarting Telestream Live Services

After you have edited the registry and hosts file on each new server, some services need to be stopped and restarted on the new server(s) and the Primary server.

Note: There are also other changes that require stopping and restarting the live services, such as changing the materials Resource Location in the Stream Edit Settings dialog. In those cases, if you have just one Lightspeed Live server you only need to perform the portion of the following procedure that affects the Primary server.

Follow these steps to stop and restart the live services:

1. Open the Services window by typing *services.msc* in the search field of the Start menu, then press Enter. The Services window opens.



2. On each new server, *Stop* the following services, **in this order**:
   a. Telestream Live Stream Service
   b. Telestream Live Source Service
   c. Telestream Live Persistence Service
3. On each new server, *Restart* the following services, **in this order**:
   a. Telestream Live Source Service
   b. Telestream Live Stream Service

   Do Not restart the Telestream Live Persistence Service
4. Close the Services window.
5. On the Primary server, *Stop* the following services, **in this order**:
   a. Telestream Live Stream Service
   b. Telestream Live Source Service
   c. Telestream Live Persistence Service

6. On the Primary server, *Restart* the following services, **in this order**:
   a. Telestream Live Persistence Service
   b. Telestream Live Source Service
   c. Telestream Live Stream Service
7. Close the Services window.

The sources from all Lightspeed Live servers should now appear in the Lightspeed Live Stream web application Sources section.

Firewalls and Blocked Ports Limit Functionality

If you have firewalls and/or blocked ports you may not be able to fully access joined Lightspeed Live servers. The servers will show up, but you may not be able to configure settings for Channels or see the Sources.

Telestream recommends that you disable the Windows Firewall on all computers that will communicate with or support Vantage services. The default Windows Firewall configuration will block access to a Vantage server from other Vantage components, such as other Vantage servers or workstations running Vantage client software.

For more information, see *Firewall Guidelines* in the Telestream *Vantage Domain Management Guide*.

Using the Live Stream Web App with Multiple Servers

When Lightspeed Live servers are joined together in a group, you manage all of the joined machines from a single Lightspeed Live Stream web application, but all machines are working independently.

The list of Sources in the Live Stream web app is separated into a section for each server, and each section can be expanded and collapsed.

Create a UNC Path for the Resource Location

When multiple Lightspeed Live servers are joined together, you should specify the *Resource Location* for Materials assets as a Universal Naming Convention (UNC) path. This allows different servers to access the image or video assets used for Segment Materials. See Editing General Settings to set the *Resource Location* path.

A UNC path looks like this: *\\hostname\Stream\Materials*.

A UNC path uses two backslashes to precede the name of the host server.

The Live Stream Web Application

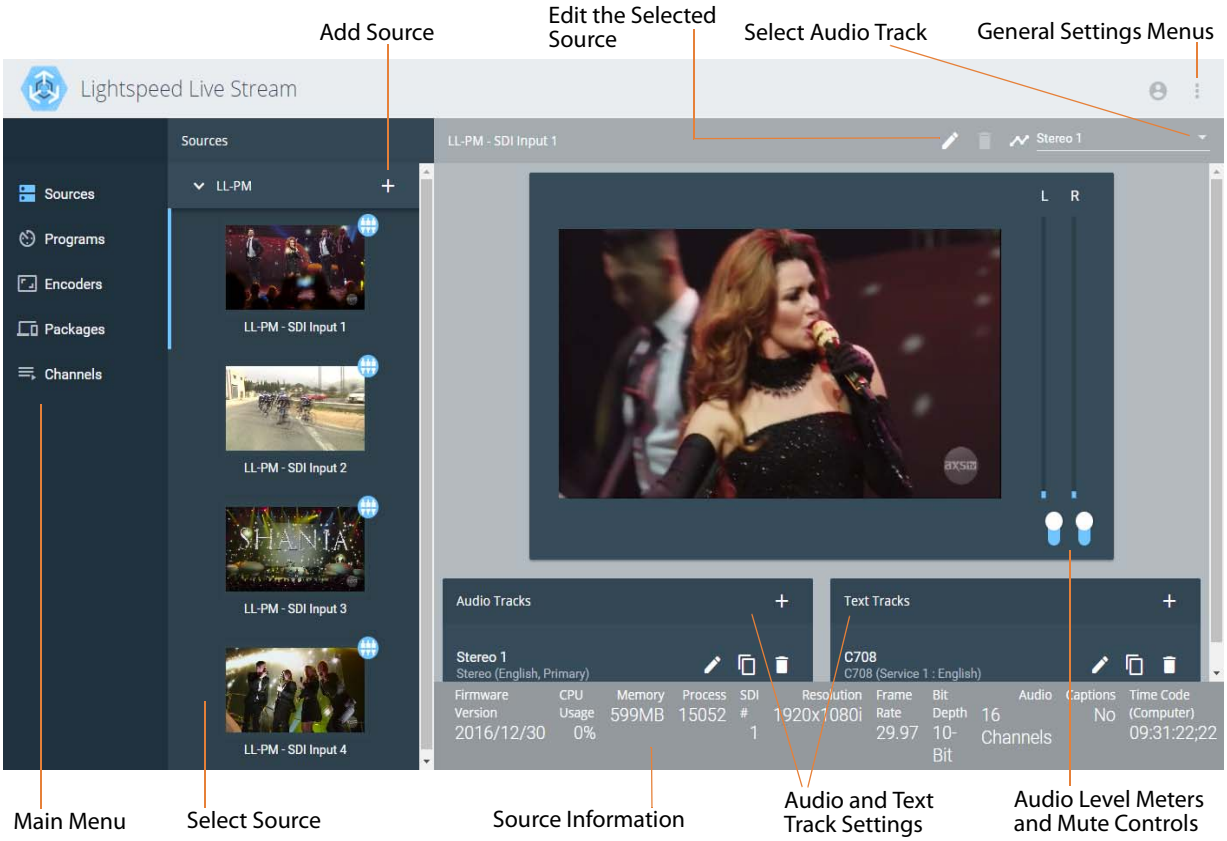
This chapter describes the Lightspeed Live Stream web application, how to install it, access it, and how to use it.

This chapter covers the following topics:

- Lightspeed Live Stream Web App Interface
- Logging Into the Lightspeed Live Stream Web App
- Multiple User Access to the Live Stream Web App
- Accessing the Lightspeed Live Guide and Web API Reference
- Activating a License
- Live Stream Web App Overview
- Exporting and Importing Settings
- Configuring the Lightspeed Live Stream Web App

Lightspeed Live Stream Web App Interface

The Lightspeed Live Stream web application provides features and options to configure and control all of your Lightspeed Live Streams.

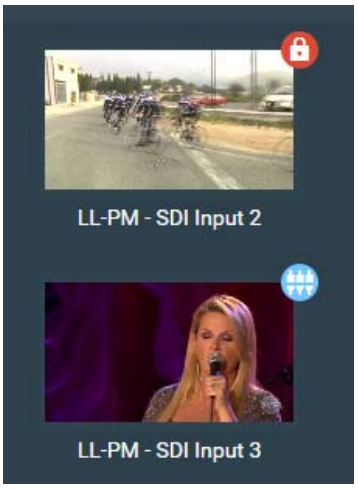


The Lightspeed Live Stream interface provides these features:

- **Add Source**—Click the **+** icon to add a new File Loop, Slate, Transport Stream, or RTMP source. SDI input sources are automatically included.
- **Edit the Selected Source**—Click the pencil icon, above the Visual Editor, to edit settings for the selected Source.
- **Select Audio Track**—From the menu in the upper right, select the Audio Track to use in the Visual Editor.
- **General Settings Menus**—Edit Settings, Change Password, Sign Out, Export/Import Configurations, Upload Assets, or About menu.
- **Main Menu**—Select the section you want to edit or view.
- **Select Source**—Select the current source to use for the stream.
- **Source Information**—Displays the information about the selected source video.
- **Audio and Text Track Settings**—Add and configure audio and captioning text tracks.
- **Audio Level Meters and Mute Controls**—Audio level meters, with mute control for each channel.

Source and Channel Indicator Icons

Icons in the upper-right of the thumbnail previews for each source in the Sources section indicate the type of source and whether that source is being used in a live stream, or if there is a loss of signal.



The following icons are provided in the Sources or Channels sections to indicate the type of source or a current state:

	SDI source
	File Loop source
	Slate source
	Transport Stream source
	RTMP source
	This source is currently being used in a stream and cannot be edited or removed
	This source has experienced a loss of signal
	Indicates that an active source needs to be selected for the Segment, when configuring Channels components
	Indicates that an activation schedule exists on that Channel

Logging Into the Lightspeed Live Stream Web App

Here's how to start and log into the Live Stream web app:

Note: Only the Chrome browser (version 50 or greater) is supported for the Lightspeed Live Stream web application.

Launch Chrome and enter the following URL in the address field:

http://<servername>:8089/live/

Servername can be the DNS name or IP address of the Lightspeed Live server.

When running Chrome locally on the Lightspeed server, you can use this URL:

http://localhost:8089/live/

Username and Password

Enter your username and password, if requested. The username is *admin*, and the default password is *live!* . The username cannot be changed.

Multiple User Access to the Live Stream Web App

Multiple users can access the Live Stream web application at the same time. It is good to be aware that more than one user can open and modify settings of a specific component at the same time for a Source, Program, Encoder, Package, or Channel. When more than one user makes changes to the same component, the last user to save the changes is what determines the final settings.

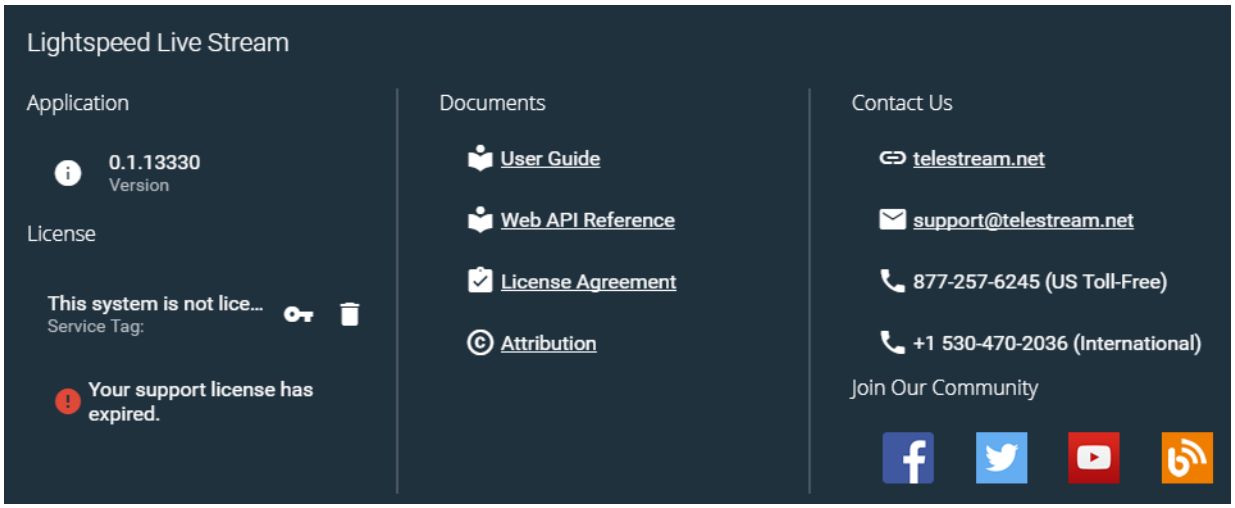
When a Channel is in the active streaming state, configuration settings cannot be changed for components of that stream, and a red lock icon appears on the upper right corner of the components and settings that are used in the stream.

Close Instances of the Live Stream Web App when Not in Use

It is important for each user to close their instance of the Live Stream web application when it is not being used. Keeping multiple web applications open can cause performance issues.

Accessing the Lightspeed Live Guide and Web API Reference

You can open the Lightspeed Live Guide (this document) from the About menu in the Live Stream web app. It is also available on the Telestream web site and on the Lightspeed Live installation disk.



Lightspeed Live Web API Reference

The Lightspeed Live Stream Web API Reference is a PDF document that provides API commands and instructions to use the Web API operations to control and monitor streaming on the Lightspeed Live Server. Programs that users write to control and monitor Lightspeed Live Stream are a supplement to the general-purpose Lightspeed Live Stream web application.

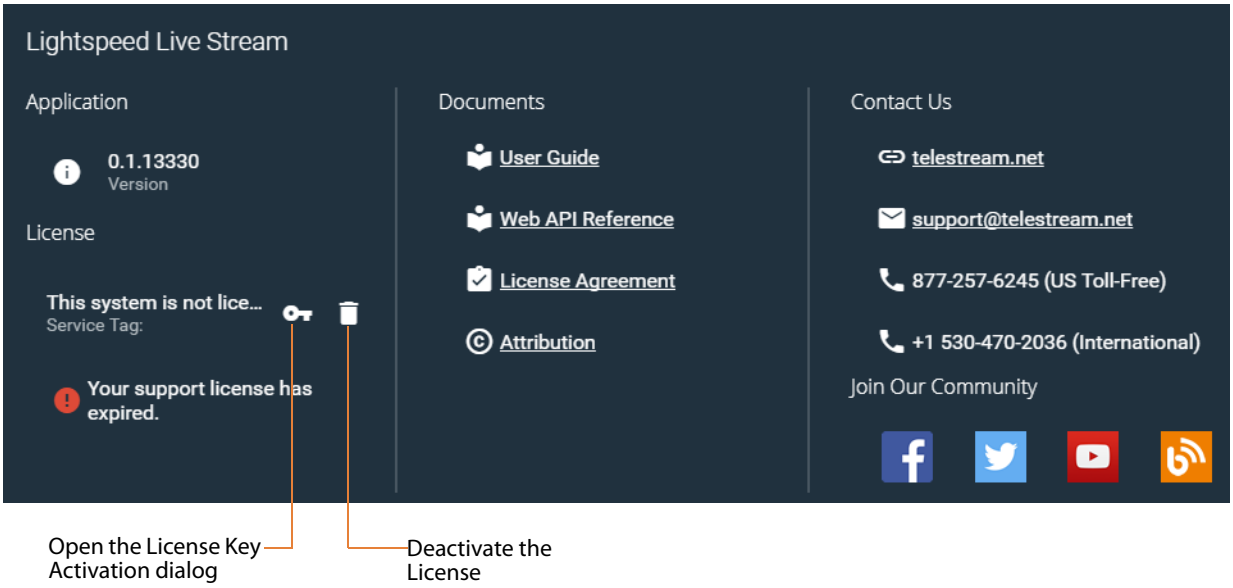
You can open the Lightspeed Live Stream Web API Reference from the About menu in the Live Stream web app. To access the Web API Reference, click the three-dot icon in the upper right of the web application, select the **About** menu and click **Web API Reference**.

Activating a License

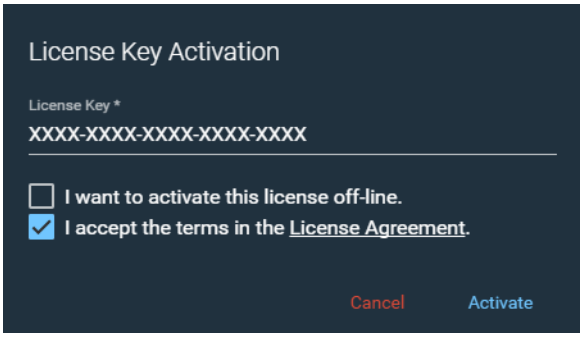
Note: When a license is not activated in Lightspeed Live Stream, the output is watermarked with the Telestream logo.

Follow these steps to add a license to Lightspeed Live Stream:

1. Click the General Stream Settings icon in the upper right of the interface and select *About* to open the About dialog.
2. Click the *Key* icon to open the License Key Activation dialog.



3. Enter your license in the License Key Activation dialog, check to accept the license agreement, then click *Activate*.



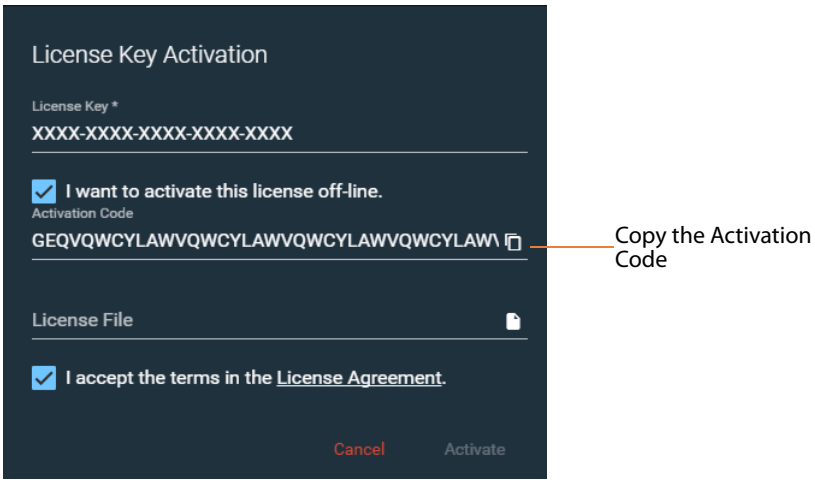
When your license has been successfully activated, a confirmation will appear which indicates the successful activation of the license.

Offline License Activation

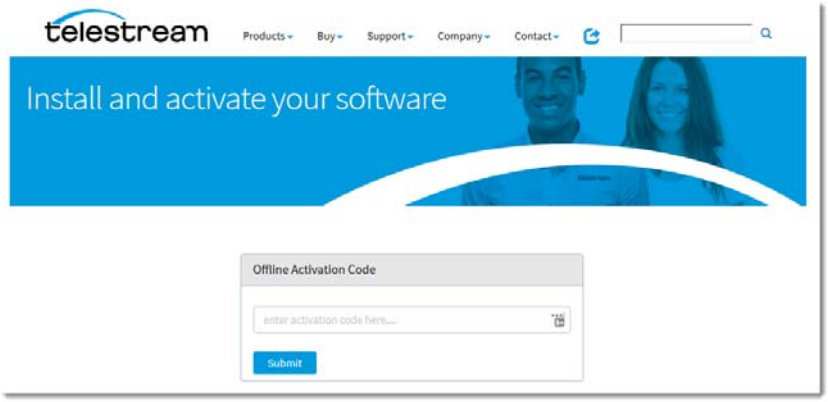
When the computer that is running Lightspeed Live Stream is not connected to the Internet, you can use the Offline Activation system to activate your license.

Follow these steps to use the Offline Activation method:

1. Click the General Stream Settings icon in the upper right of the interface and select *About* to open the About dialog.
2. Click the *Key* icon to open the License Key Activation dialog.
3. Enter the license you purchased into the License Key field.
4. Check *I want to activate this license off-line*, and an Activation Code is provided.

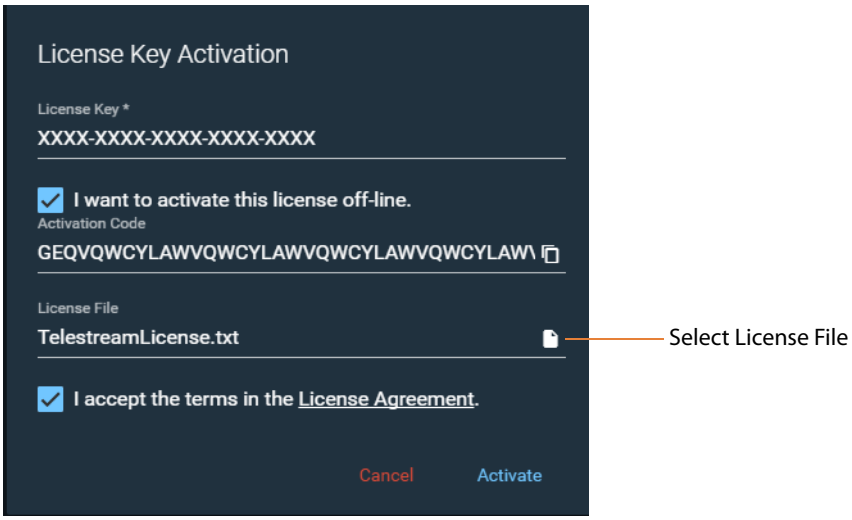


5. Click the Copy button to copy the Activation Code to your clipboard.
6. Open a text editor and paste the Activation Code into the page, and save that file to a convenient location.
7. Transfer that text file to a portable device, such as a thumb drive.
8. Take the thumb drive to a computer that has Internet access.
9. Open a browser on the Internet access computer and go to https://cws.telestream.net/offlineactivation.aspx. (Note: You may want to copy this link into the same text file, or take a copy of this guide to the Internet computer.)



10. Open the text file and copy the Activation Code to the clipboard of the Internet computer, paste it into the Offline Activation Code entry field in the Telestream web page, then click *Submit* to generate the Server Key file.

11. Depending on your browser settings, you may be provided with a dialog giving you the option to save or open the Server Key file. Select Save. Or, the browser may automatically save it to a default location.
12. Locate the Server Key file and copy it to the thumb drive and take it back to the computer that is running Lightspeed Live Stream.
13. In the Server Key field on the License Key Activation dialog click the *Select License File* button, then navigate to the location of the Server Key file and select it.

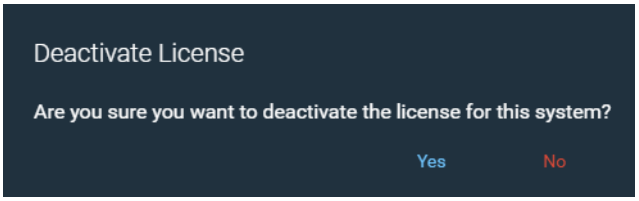


14. When the Server Key file is loaded into Live Stream, check to accept the license agreement, then click *Activate*.

When your license has been successfully activated, a confirmation will appear which indicates the successful activation of the license.

Deactivating a License

To deactivate your license, select the *Deactivate* (trash can) icon in the About dialog. When the dialog appears, click Yes to deactivate or No to cancel the dialog and keep the license active.



Note: This deactivation process only works when the computer that is running Lightspeed Live Stream is connected to the Internet. For offline deactivation, contact Telestream Support.

Live Stream Web App Overview

To help you gain a better understanding of the Lightspeed Live Stream web application, this section provides these topics:

- Components of the Live Stream Web App
- Configuration Order for Setting Up Live Stream
- Operation Flow through Live Stream Components

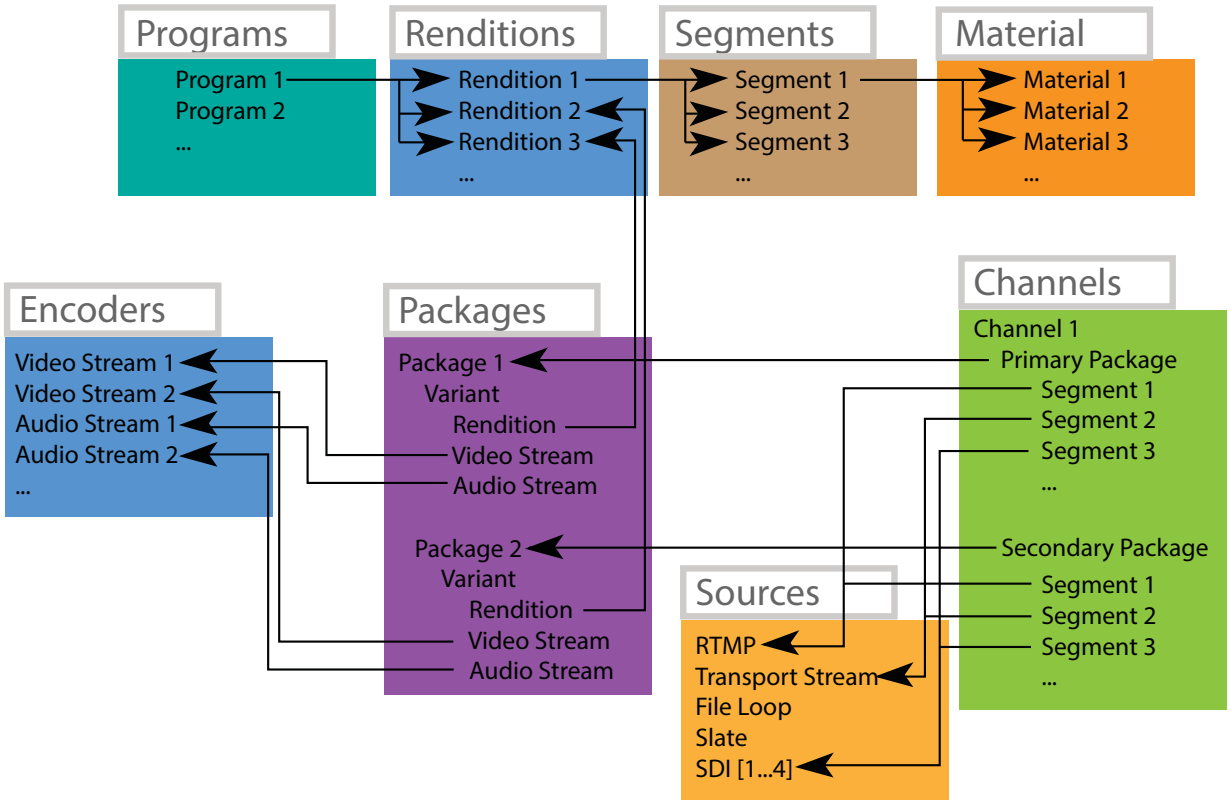
Components of the Live Stream Web App

The following provides an overview of the components of the Live Stream web app, describing their basic purpose, function, and interaction.

Component Relationships

The following diagram shows the relationships and connections that Live Stream components have with each other. The arrows in the diagram indicate the items you select in each component to complete that stage of the configuration.

For example, in each Variant of a Package you select the Rendition, Video Stream, and Audio Stream to use; in each Channel you select Packages and the source for each Segment.



Sources

The Sources view provides a thumbnail preview of each source content, a larger preview of the selected source, controls to add and configure sources, and controls to add and configure audio and text tracks for each source. When a video signal is active there is a thumbnail preview for each input. If there is no active signal, color bars are displayed.

Sources define specific media that may be encoded and streamed. Default sources include 4 SDI streams. You can also add slates, images, and other media files, as well as live RTMP and Transport Streams. When there are multiple Lightspeed Live servers, the list of Sources in the Live Stream web app is separated into a section for each server, and each section can be expanded and collapsed.

Input sources:

- **SDI**—The default sources, from the four Lightspeed Live server SDI inputs.
- **File Loop**—A file that can repeat continuously.
- **Slate**—A test pattern image to display when there is no signal.
- **Transport Stream**—From any of the four Ethernet ports of the server.
- **RTMP**—From an Ethernet port, from systems such as Telestream's Wirecast application.

Up to four RTMP or Transport Stream sources can be connected to Live Stream.

Programs

A Program defines the media that will ultimately be encoded and streamed. Programs are comprised of specific renditions of media segments.

These components must be configured for proper Program operation:

- Every Program needs at least one Rendition.
- Every Rendition needs at least one Segment.
- In Materials for a Segment, a Source Placeholder is added when you want to connect an input feed to an output during later Channel configuration.
- Multiple Segments will need Trigger Conditions to declare which Segment is to be encoded at any given time.

Renditions

Renditions are the building blocks of a program and contain associated Segments. They specify the audio format (stereo, for example) and the language.

Segment

A Segment contains Materials and the Trigger Conditions that determine when the Segment is active. Segments are added to Renditions.

Materials

Materials contains the media assets for the Segment, such as graphics and video or audio materials. A Source Placeholder is needed when you want to use a source for the output when later configuring a Channel.

Trigger Conditions

Trigger Conditions define when a Segment is active, and a Segment with no Trigger Conditions is assumed to always be active. The visual stack order of Segments and Trigger Conditions defines which segment will be encoded at any given time. The lowest on the stack that is active is encoded first. See Setting Trigger Conditions for more details.

Encoders

The Encoders section provides options to configure the encoder parameters for the audio and video Streams.

Encoder Streams

The Streams for each Encoder is where you specify the actual Encoder settings of bitrate, frame rate, size, and so on. The Streams are then chosen in Package Variants.

Packages

In the Packages section you choose the type of packages you want to create (such as Apple HLS, DASH, RTMP, Facebook Live, or YouTube Live), select a previously defined Program to use with the Package, and configure package settings.

Package Variants

A Variant associates a Program's Rendition with previously defined video/audio Encoder stream definitions. A Package must include one or more Variant.

Channels

In Channels you select Packages to use for each Channel, select output locations, and select an input source for each Segment. When you start the Channel, the active Source is encoded to the Package Variant definitions and delivered to the locations you have specified.

When a Stream is active, an updating thumbnail preview is displayed for each Variant, as well as statistics for the resources being used.

Configuration Order for Setting Up Live Stream

The following steps outline the order in which Lightspeed Live Stream should be configured so that components are ready and available to be used when configuring the next section.

1. Sources

a. Start by adding any Sources you want, in addition to the default SDI inputs.

b. Make adjustments, as needed, to the configuration settings.

c. An Audio Track is added, by default, when a source is created. Configure audio settings as needed and add any optional Audio and Text Tracks.

See Configuring Sources.

2. Programs

a. Add a Program and configure it. Create additional Programs if you need them.

b. Add a Rendition to each Program. Every Program needs at least one Rendition.

c. Add a Segment to each Rendition. Every Rendition needs at least one Segment.

d. Within each Segment you add Materials.

e. In the Segment's preview window you can adjust the size and location of any images or video assets, in order to get the look you want.

f. Create Trigger Conditions, if needed, that define when each Segment is active. A Segment with no Trigger Conditions is assumed to always be active.

See Configuring Programs.

3. Encoders

a. Add the AAC audio encoder group, then add and configure at least one audio Stream.

b. Add the video encoder group(s) you want, then create and configure at least one Stream for each encoder group.

See Configuring Encoders.

4. Packages

a. Add the Packages you want to use, and configure them to select the Program to use with each one.

b. Add at least one Variant to each Package. In each Variant you select a Rendition and the audio and video Encoder Stream to use.

See Configuring Packages.

5. Channels

a. Add at least one Channel, selecting the appropriate Packages to use for the Channel.

b. Select the Output Locations, adding any specific destination criteria.

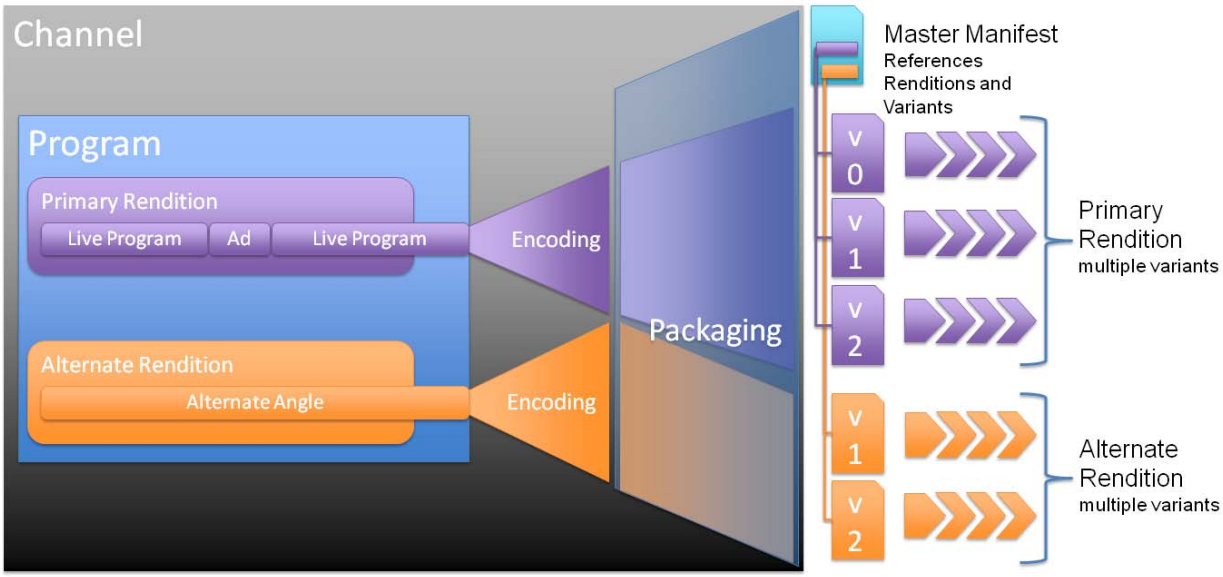
c. In the Segments column, select the Input source to use for each Segment.

d. Click the Start button to activate the Stream for the selected Channel.

See Configuring Channels.

Operation Flow through Live Stream Components

The following diagram shows a typical operation flow through the components of Lightspeed Live Stream.



In this example there are two Renditions in the Program. The Alternate Rendition can be used to provide time-aligned alternate versions of content, such as an alternate angle of an in-car view of a race that a user can choose instead of the normal line program feed.

The Variants in this example are used as part of a package, with a Master Manifest, to provide ABR (Adaptive Bit Rate) content of different formats for use on various devices and bandwidths. The ABR package, in DASH or HLS format, allows a video player app or device to see what renditions and what variants of each rendition are available to play.

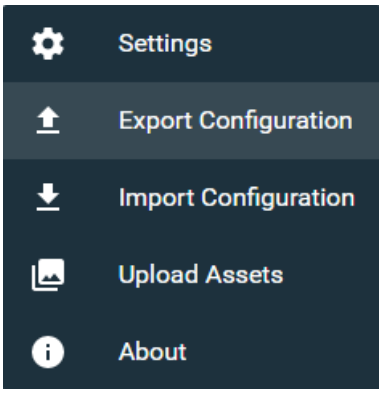
Exporting and Importing Settings

The Live Stream configuration settings for Sources, Programs, Encoders, Packages, Channels, and General Settings can all be exported or imported as a single XML file. When you import configuration settings they are added to your existing settings, so your existing settings are retained.

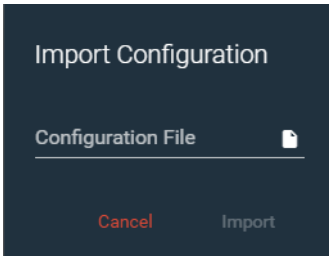
Note: When importing settings, SDI sources will have an additional audio track added to the original one.

The XML configuration settings file is exported to the folder that you have set in your web browser for downloads, or a Save As dialog may appear if you have your browser set for that option. The default file name is "export.xml". If a file of the same name already exists from a previous export, an incremental number is added starting with "export(1).xml".

To perform an export or import of the configuration settings click the General Settings icon in the upper right of the interface and select *Export Configuration* or *Import Configuration* from the menu.



For an import, click the folder icon in the Import Configuration dialog, as shown in the following image, to browse and select the file to import.



Configuring the Lightspeed Live Stream Web App

The Lightspeed Live Stream web application provides access to and control of the Lightspeed Live Stream content.

These topics are covered:

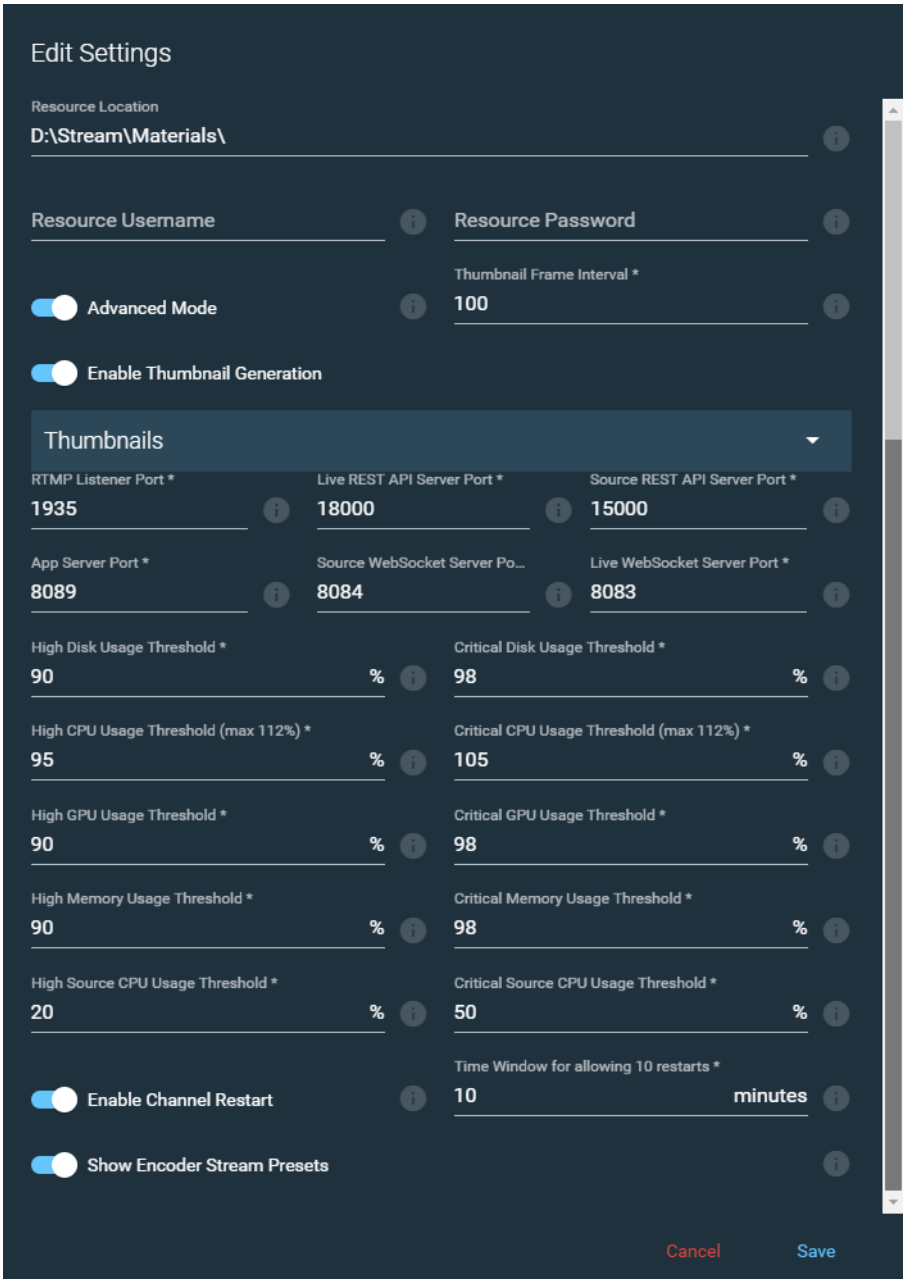
- Editing General Settings
- Configuring Sources
- Configuring Programs
- Configuring Encoders
- Configuring Packages
- Configuring Channels

Note: When a stream has been activated by clicking the Start button in Channels, configuration settings cannot be changed for that stream, and a red lock icon appears on the upper right corner of the components and settings that are used in the stream. When Stop is pressed, components can again be edited.

When components are locked, some settings can still be duplicated.

Editing General Settings

Click the General Settings icon in the upper right corner of the window and select *Settings* to display the Edit Settings dialog.



The Edit Settings dialog provides these options:

- **Resource Location**—The directory for you to place graphics, animations, video, and audio resources for access in the Materials section of a Program Segment. The default location is D:\Stream\Materials\ on the primary machine. You can change the location by editing it here. The resources placed in this location are selected in the Materials dialog to be used in a Segment. See Adding Materials.

Note: You must restart services for a change to the Resource Location to take effect, otherwise the old location is used. See Stopping and Restarting Telestream Live Services for instructions.

Note: When multiple Lightspeed Live servers are joined together, the *Resource Location* for Materials assets needs to be a UNC path. This allows different servers to access the image or video assets used for Materials.
A UNC path looks like this: *hostname**d**Stream**Materials*.

- **Resource Username**—The user name for the resource location, if needed. If the resource is on a domain, the domain name should be added to the user name. For example, [domain]\username.
- **Resource Password**—The password for the resource location, if needed.
- **Advanced Mode**—Enables a special mode which provides additional feedback, and enables additional settings options in some dialogs.
- **Thumbnail Frame Interval**—The number of frames between each thumbnail refresh. The default is 25.
- **Enable Thumbnail Generation**—Enables the generation of thumbnails for active Channels.
  - **Directory**—The location for generated thumbnails. The default location is D:\Stream\Thumbnails\ on the primary machine. You can change the location by editing it here. Sub-folders are automatically created using the Channel name and Variant name.
  - **Limit**—Sets the maximum number of thumbnails to keep in the specified directory. The default is 25 and the available range is 5 to 250.
  - **Publishing Point**—Enable, then enter a URL so the thumbnails can be viewed on a web server.
  - **Custom Width and Height**—Enable the width and height to set a custom width or height of the thumbnails in pixels. Both must be enabled for changed settings to take effect. The default width is 128 and the default height is 96. The width range is 128 to 4096 and the height range is 96 to 2160 pixels.

Note: The highest port number allowed is 65534 for the configurable ports.

- **RTMP Listener Port**—The port that the RTMP server listens on. The default is port 1935, and only should be changed if that port is used for something else. You must restart Live Services for the change to take effect.

Note: If you change any of the port settings, Live Stream services must be restarted to use the new port, otherwise the old port will continue to be used. See Stopping and Restarting Telestream Live Services. The affected settings are the *RTMP Listener Port*, *App Server Port*, *Source WebSocket Server Port*, and the *Live WebSocket Server Port*.

- **REST API Server Port**—Specifies the port number of the REST API server. The default is 18000. You must restart Live Services for the change to take effect.
- **App Server Port**—Specifies the port number of the web application server. The default is 8089. You must restart Live Services for the change to take effect.
- **Source WebSocket Server Port**—Specifies WebSocket Server port number for the Source manager. The default is 8084. You must restart Live Services for the change to take effect.
- **Live WebSocket Server Port**—WebSocket Server port number for the Live manager. The default is 8083. You must restart Live Services for the change to take effect.
- **High Disk Usage Threshold**—Specifies the threshold that generates a High Disk Usage warning. The default is 90%.
- **Critical Disk Usage Threshold**—Specifies the threshold that generates a Critical Disk Usage warning. The default is 98%.
- **High CPU Usage Threshold**—Specifies the threshold that generates a High CPU Usage warning. The maximum is 112 percent. The default is 95%.
- **Critical CPU Usage Threshold**—Specifies the threshold that generates a Critical CPU Usage warning. The maximum is 112 percent. The default is 105%.
- **High GPU Usage Threshold**—Specifies the threshold that generates a High GPU Usage warning. The default is 90%.
- **Critical GPU Usage Threshold**—Specifies the threshold that generates a Critical GPU Usage warning. The default is 98%.
- **High Memory Usage Threshold**—Specifies the threshold that generates a High Memory Usage warning. The default is 90%.
- **Critical Memory Usage Threshold**—Specifies the threshold that generates a Critical Memory Usage warning. The default is 98%.
- **High Source CPU Usage Threshold**—Specifies the threshold that generates a High Source CPU Usage warning. The default is 20%.
- **Critical Source CPU Usage Threshold**—Specifies the threshold that generates a Critical CPU Usage warning. The default is 50%.
- **Enable Channel Restart**—When enabled, active channels will restart if streaming is interrupted. When disabled, the restart feature is immediately turned off for active channels.
- **Time Window for Allowing 10 Restarts**—Specifies the amount of time in which, if 10 channel restarts occur, the channel shuts down. The default is 10 minutes.
- **Show Encoder Stream Presets**—Enables lists of presets to pick from when creating new Encoder streams.

Configuring Sources

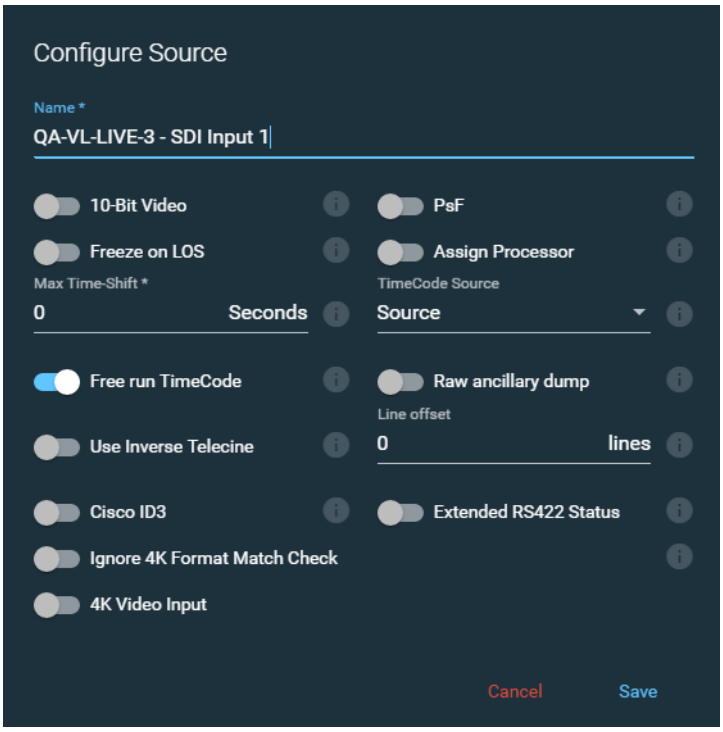
In the Sources panel you can add and edit sources. Click the + icon to add a Source. By default, there are four SDI sources that automatically show the current input, or color bars if there is no input. These inputs can be combined to make a single 4K input. You can edit the SDI sources but not delete them. They update when you change the SDI input source. For supported formats see Supported Live Stream Source Input Formats.

- Configuring an SDI Source
- Configuring a File Loop Source
- Configuring a Slate Source
- Configuring a Transport Stream Source
- Configuring an RTMP Source
- Configuring Audio Tracks
- Adding Text Tracks for 608 and 708 Captions

Note: Sources can not be edited when they are being used by an active Channel.

Configuring an SDI Source

Click the pencil icon to open the Configure Source dialog for the selected SDI source.



The Configure Source dialog provides these options for the SDI input sources:

- **Name**—Enter or edit the name of the source.
- **10-Bit Video**—Sets the source to be 10-bit video rather than 8-bit.

- **PsF**—Turn on when the SDI input is Progressive Segmented Frame.
- **Freeze on LOS**—Causes the source to hold the last good frame if there is a loss of signal.
- **Assign Processor**—Assign this source and its dependents to a processor. When on, all processing is assigned to a single multicore CPU socket. This prevents inefficient mapping of processes across CPU sockets during heavy loads, such as when all four inputs are being processed. Works for SD/HD sources only, not 4K.
- **Max Time-Shift**—Sets the size of the internal Time-Shift buffer that may be used to delay the source. **Note:** This setting only applies to Live Capture.
- **Timecode Source**—Set the default timecode source. The options are Source, Computer Clock, Free Run, and Analog LTC. Do not select the RS422 option (if available), because it is only used for Live Capture operations.
- **Free Run TimeCode**—When enabled, the timecode will free-run when the source timecode is missing. The default is enabled.
- **Raw Ancillary Dump**—Only available when Advanced Mode is turned on in the Stream Settings dialog. **Note:** This setting only applies to Live Capture. ***WARNING:*** *Do not enable this option unless directed to by Telestream Support*.
- **Use Inverse Telecine**—Sets the source to be deinterlaced using Inverse Telecine settings.
- **Line Offset**—Shift the video by the specified line offset. The range is -4 to 4 lines. **Note:** This setting only applies to Live Capture.
- **Cisco ID3**—Enable to allow the SCTE-104 information to be converted to ID3 on output. This option can also be turned off or on from Live Capture when configuring SDI sources, see Cisco ID3 in the *"Configuring SDI Source Options"* topic in the *Lightspeed Live Capture User Guide*.
- **Extended RS422 Status**—This setting only applies to Live Capture.
- **Ignore 4K Format Match Check**—When enabled, Live Stream will add a UHD/4K source via SDI inputs even if all four quadrants do not have a matching signal. When there is not a valid 4K signal from all quadrants, the entire output displays the 4K signal as color bars. When disabled, all four quadrants of a UHD/4K source must match for the 4K mode to be activated. Unmatched quadrants can occur when some UHD/4K sources are not currently playing video.
- **4K Video Input**—Sets the source to 4K video input. When activated, all four SDI inputs are merged into one 4K input. Choose from one of the following Quad-Split Schemes:
  - **Square Division**—The image is divided into four quadrants.
  - **2SI-A**—Two Sample Interleave, type A.
  - **2SI-B**—Two Sample Interleave, type B.

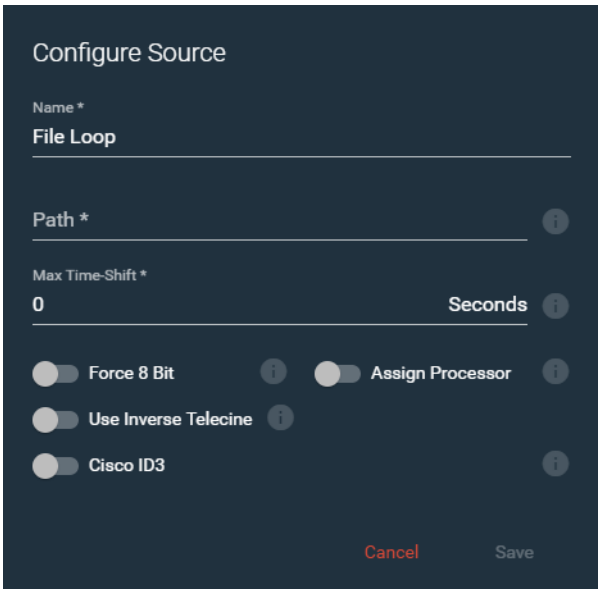
Note: To successfully switch between the 2SI-A or the 2SI-B setting, you must first select Square Division, save the change, then reopen the dialog and select the A or B setting you want to switch to.

Note: The SDI inputs on the Lightspeed server cannot differentiate between 4K and HD/SD signals. When the server inputs are receiving a 4K signal, but the *4K Video Input* switch is not enabled, the four corners of the source are divided into the four SDI inputs. To get one source that will use the full 4K signal you must enable the *4K Video Input* switch in one of the SDI inputs.

When the SDI inputs are receiving HD/SD signals and the *4K Video Input* switch is enabled, there will be a single SDI 4K input source that has four segments of duplicate video in it. All four inputs must be synchronous, and have the same frame rate and resolution in order to be combined into a single source view.

Configuring a File Loop Source

Plays a looping file.



The File Loop Configure Source dialog provides these options:

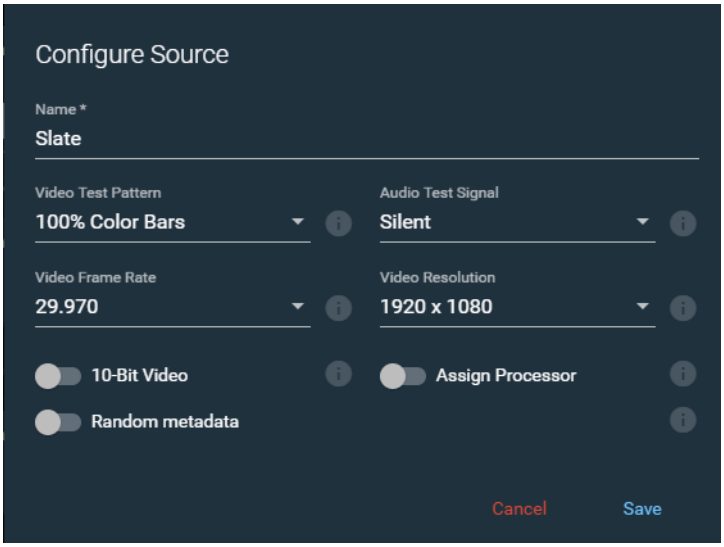
- **Name**—Enter or edit the name of the File Loop.
- **Path**—Enter the path for the looping file source.
- **Max Time-Shift**—Sets the size of the internal Time-Shift buffer that may be used to delay the source. **Note:** This setting only applies to Live Capture.
- **Force 8 Bit**—Forces the source to be 8 bit instead of 10 bit regardless of original source.
- **Assign Processor**—Assign this source and its dependents to a single processor. When on, all processing is assigned to a single multicore CPU socket. This prevents

inefficient mapping of processes across CPU sockets during heavy loads, such as when all four inputs are being processed. Works for SD/HD sources only, not 4K.

- **Use Inverse Telecine**—Sets the source to be deinterlaced using Inverse Telecine settings.
- **Simulate Deck**—Simulates a VTR tape deck. Only available when Advanced Mode is turned on.
  Note: This setting only applies to Live Capture.
- **Cisco ID3**—Enable to allow the SCTE-104 information to be converted to ID3 on output. This option can also be turned off or on from Live Capture when configuring SDI sources, see Cisco ID3 in the *"Configuring SDI Source Options"* topic in the *Lightspeed Live Capture User Guide*.

Configuring a Slate Source

A Slate is the test pattern image to display when there is no signal.



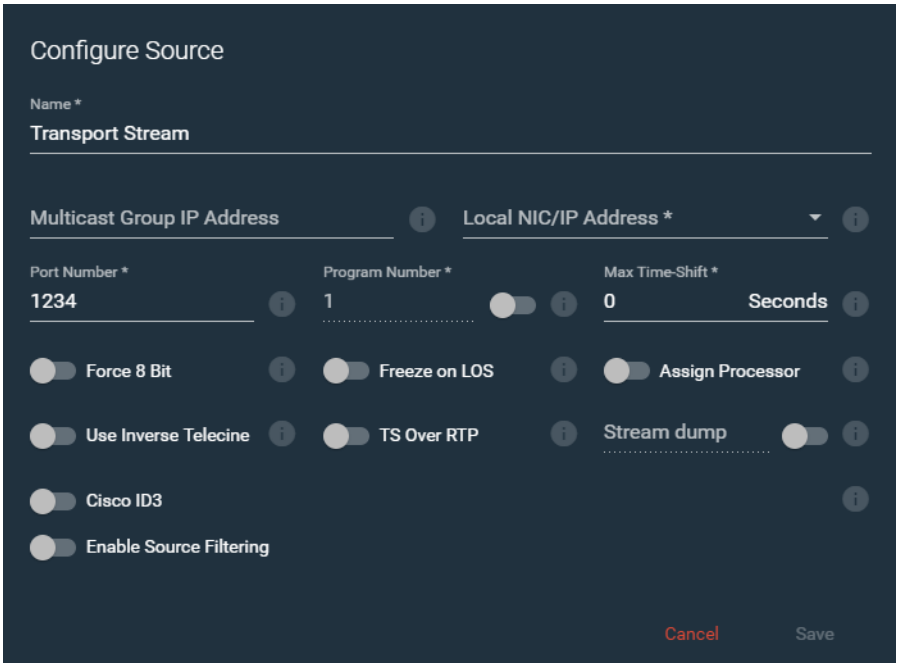
The Slate Configure Source dialog provides these options:

- **Name**—Enter or edit the name of the Slate.
- **Video Test Pattern**—Choose the video test pattern to display.
- **Audio Test Signal**—Select the audio test signal to use.
- **Video Frame Rate**—Choose the video frame rate to use for the Slate.
- **Video Resolution**—Select the video resolution to use for the Slate.
- **10-Bit Video**—Sets the Slate to be 10-bit video rather than 8-bit.
- **Assign Processor**—Assign this source and its dependents to a single processor. When on, all processing is assigned to a single multicore CPU socket. This prevents inefficient mapping of processes across CPU sockets during heavy loads, such as when all four inputs are being processed. Works for SD/HD sources only, not 4K.

- **Random Metadata**—Assigns random metadata to this source. Used for testing purposes.

Configuring a Transport Stream Source

Click the + icon to open the Configure Source dialog to add a Transport Stream source.



IMPORTANT NOTE: The settings for *Multicast Group IP Address, Local NIC/IP Address, Port Number,* and *Program Number* can *only* be changed when you are first adding a new Transport Stream source. After the source has been added, only the other settings for the Transport Stream source can be edited.

The Transport Stream Configure Source dialog provides these options:

- **Name**—Enter or edit the name of the stream.
- **Multicast Group IP Address**—The optional Multicast Group IP address to use.
- **Local NIC/IP Address**—The local NIC (Network Interface Card)/IP address. Select other ones from the menu, if they are available.

Note: When a new network adapter is added, or changed from disabled to enabled state, Live Stream services must be restarted for the service to be available in the Local NIC/IP Address menu. See Stopping and Restarting Telestream Live Services.

- **Port Number**—Enter or select the port number.
- **Program Number**—Set the slide button to the on position to enable, then enter or select the program number. When disabled, the first available program is used.

- **Max Time-Shift**—Sets the size of the internal Time-Shift buffer that may be used to delay the source. **Note:** This setting only applies to Live Capture.
- **Force 8 Bit**—Forces the source to be 8 bit instead of 10 bit regardless of original source.
- **Freeze on LOS**—Causes the source to hold the last good frame if there is a loss of signal.
- **Assign Processor**—Assign this source and its dependents to a single processor. When on, all processing is assigned to a single multicore CPU socket. This prevents inefficient mapping of processes across CPU sockets during heavy loads, such as when all four inputs are being processed. Works for SD/HD sources only, not 4K.
- **Use Inverse Telecine**—Sets the source to be deinterlaced using Inverse Telecine settings.
- **TS Over RTP**—When enabled, wraps the Transport Stream in an RTP packet.
- **Stream dump**—Available when Advanced Mode is enabled in the Settings dialog. When enabled, captures the Transport Stream source to the location and file you specify, until you turn this *Stream dump* option off. Type the path, folder, and file name into the Stream dump field. The file extension should be .ts. If the folder you specify does not exist, the new folder and file will be automatically created.
- **Cisco ID3**—Enable to allow the SCTE-104 information to be converted to ID3 on output. This option can also be turned off or on from Live Capture when configuring SDI sources, see Cisco ID3 in the *"Configuring SDI Source Options"* topic in the *Lightspeed Live Capture User Guide*.
- **Enable Source Filtering**—When enabled, you can enter a list of accepted source IP addresses. To add IP addresses to the list, press the Enter key after entering an IP address to add a new entry line.

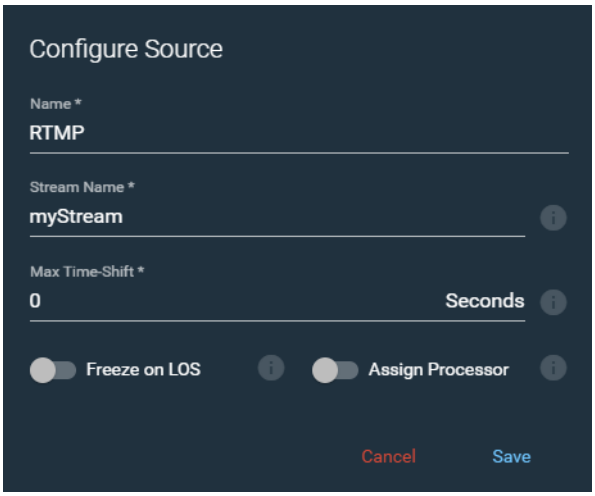
SCTE-35 Information and ID3 Tag Pass Through or Insertion

When a Transport Stream source contains SCTE-35 information or ID3 tags, this data is passed through to the output. SCTE-35 and ID3 data can also be inserted via the Sources API.

Configuring an RTMP Source

Click the **+** icon to open the Configure Source dialog to add an RTMP source. Up to four RTMP sources can be connected to Live Stream.

Note: The RTMP Source must be added to Live Stream *first* and then the RTMP source that will be ingested can be started.



IMPORTANT NOTE: The options for an RTMP source can *only* be changed when you are first adding a new source. After the source has been added, only the Name can be changed. After an RTMP stream has connected, the Name cannot be changed. When you want different settings you can add another new RTMP source.

The RTMP Configure Source dialog provides these options:

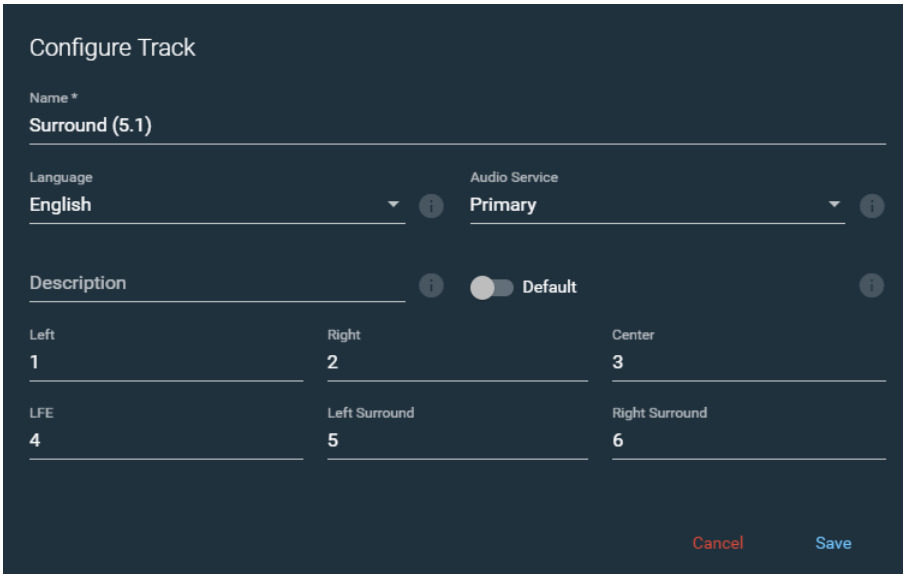
- **Name**—Enter or edit the name to use within Stream.
- **Stream Name**—Enter the name of the RTMP stream source. This Stream Name can be changed multiple times until an RTMP stream source is connected. After an RTMP stream has connected, this Stream Name cannot be changed.
- **Max Time-Shift**—Sets the size of the internal Time-Shift buffer that is used to delay the source. **Note:** This setting only applies to Live Capture.
- **Freeze on LOS**—Sets the source to hold the last good frame if there is a loss of signal.
- **Assign Processor**—Assign this source and its dependents to a single processor. When on, all processing is assigned to a single multi-core CPU socket. This prevents inefficient mapping of processes across CPU sockets during heavy loads, such as when all four inputs are being processed. Works for SD/HD sources only, not 4K.

Configuring Audio Tracks

An Audio Track is added, by default, when a source is created and it usually is automatically configured to match the source. Click the **+** icon in Audio Tracks to add more tracks, if desired. Select a Mono, Stereo, or 5.1 Surround track. You can add multiple tracks to provide for different languages, various services, or other variations. The channel assignments can be changed if you want specific different configurations.

You can configure the Audio Track settings to allow the Programs that use these Audio Tracks to use the correct track based on parameters of the selected labels. The Language and Service labels do not affect the final streaming output, but can be used within the Live Stream web app to identify various types of sources or setting configurations.

Note: If you have a 5.1 surround input source, and select stereo audio track settings, then only source channels one and two are used (unless you edit the audio track settings to use different audio channels).



The Configure Track dialog provides these options:

- **Name**—Enter or edit the name of the audio track.
- **Language**—Select the language to use for this track. (Does not affect final output).
- **Audio Service**—Select the audio service label to use for this track: Primary, Secondary, Commentary, or Music. (Does not affect final output).
- **Description**—Enter a description for the audio track.
- **Default**—Turn on to set the audio track as the default. When turned on, that track is the one used first when you select the input source to preview. You can select a different Audio Track to use for the preview from the menu in the upper right of the Sources section.

Setting a track to Default also marks it as the settings to use for the *Channel Assignment* of the output. However, the audio encoder setting determines the actual channel type of Mono, Stereo, or 5.1 to use for the output. See the AAC Audio Encoder Group, *AAC Channel Layout* setting.

- **Channel Assignment**—The type of audio signal to assign to each channel. The default for Mono is Center=1; for Stereo is Left=1, Right=2; for Surround (5.1) is Left=1, Right=2, Center=3, LFE=4, Left Surround=5, and Right Surround=6.

Selecting the Audio Track for the Sources Preview

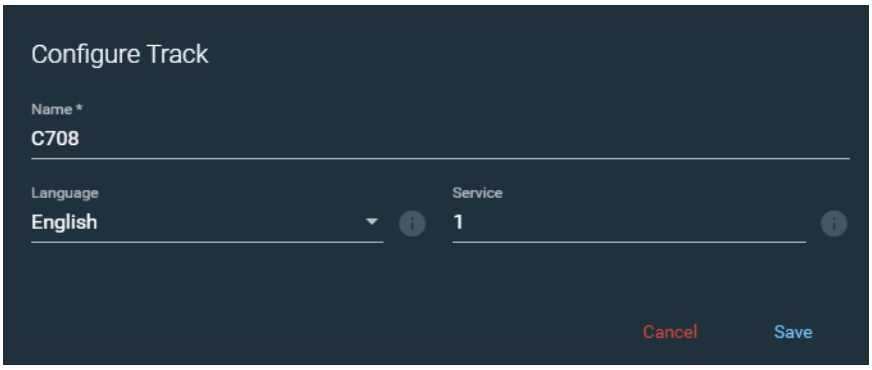
When there is more than one Audio Track, you can select the track that you want to see and hear in the Sources preview pane by selecting it from the menu in the upper right of the Sources window. You must add tracks first, in order to make them available to select.

If you do not select a specific Audio Track from this menu, then the one that you have set as Default is used.

Adding Text Tracks for 608 and 708 Captions

Add Text Tracks so you can select either C608 or C708 caption tracks that are provided with the input source. Click the **+** icon in Text Tracks to add a caption track, and select C608 or C708. The provided caption text track is included with the streamed output when used with compatible delivery methods and destinations.

Note: Captions in your source are preserved and passed through even if you don't add a Text Track. Text Tracks allow you to select either a C608 or C708 option.



- **Name**—Enter or edit the name of the text track.
- **Language**—Select the language of the caption text track. When HLS or DASH is streamed, the language title is displayed to the end-user in caption-compatible players so they can select the language and enable the caption text track.
- **Service**—Set the Service number to use for this caption track. The default is 1.

Configuring Programs

These topics cover aspects of Programs:

- Adding a Rendition
- Adding a Segment
- Adding Materials
- Setting Trigger Conditions
- Stacking Order Determines which Segment is Primary

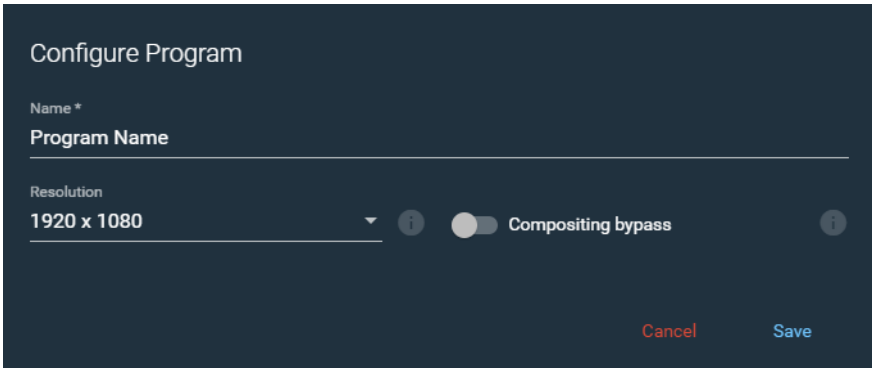
In the Program section you add and edit Programs, Renditions, and Segments. Click the + icon to add a Program and click the 3-dot icon ⋮ to edit or delete the selected Program.

In Programs you set the name and select the resolution for each Program you want to create. Within a Program you specify settings for various Renditions, add Segments to a Rendition, add Materials to each Segment, and then create the Trigger Conditions that define when each Segment is active.

These components must be configured for proper Program operation:

- Every Program needs at least one Rendition.
- Every Rendition needs at least one Segment.
- In Materials for a Segment, a Source Placeholder is added when you want to connect an input feed to an output during later Channel configuration. If a Program is only used to provide a Segment image or video asset, a Source Placeholder is not needed.
- Multiple Segments need Trigger Conditions to declare which Segment is to be encoded at any given time.

A single Rendition and a single Segment can be used when you are only encoding a source. Multiple Segments are typically used for ad insertion, local blackouts, and trouble messages (such as, “experiencing technical difficulties”). Multiple Renditions, for example, can be used for multi-language delivery (different graphics and/or audio), different cameras, or feeds from a live event.



The Configure/Edit Program dialog provides these options:

- **Name**—Enter/edit the name of the Program.

- **Program Resolution**—Select the resolution to use for the Program. The default is 1920 x 1080. The choices are 720 x 480, 720 x 576, 1280 x 720, 1920 x 1080, 2048 x 1080, 3840 x 2160, and 4096 x 2160.
- **Compositing Bypass**—Select this option to bypass compositing. Use to save time when the program is very simple, such a pass-through with no added graphics or audio remapping. Only available when Advanced Mode is turned on in the General Settings dialog.

Note: The *Low Latency* option in Encoders must also be enabled when *Compositing Bypass* is enabled.

Adding a Rendition

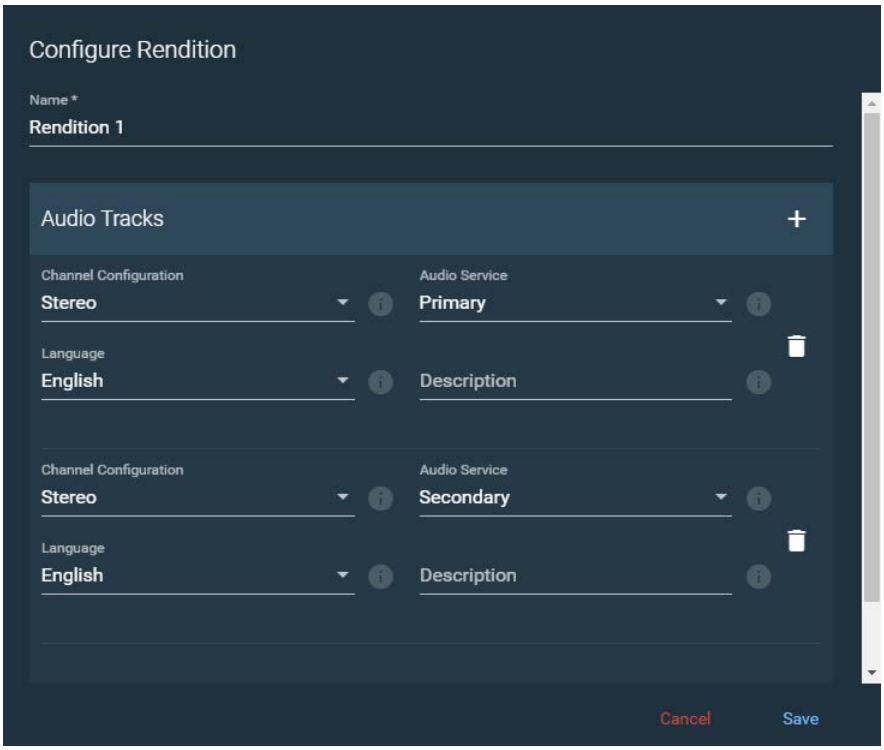
Click the **+** icon in a Program to add a Rendition. Click the 3-dot icon ⋮ to edit, copy, or delete the Rendition. A Rendition allows you to set audio and language parameters for each Rendition and associated Segments.

When you want to use a specific Audio Track channel assignment from Sources, you need to select the exact same settings for *Channel Configuration*, *Audio Service*, and *Language* here in Renditions. When all of these settings match, the *Channel Assignments* specified in the Sources Audio Track is used for the Mono, Stereo, or 5.1 output.

Note: The final output channel type of Mono, Stereo, or 5.1 is determined by the audio encoder AAC or AC3 *Channel Layout* setting.

Creating Multiple Audio Track Output

The audio tracks added to a Rendition can all be included in the output, thus creating multiple audio track output. To create multiple audio track output, you must first create the additional tracks in the Sources section. Then any audio track you add in Renditions must have the exact same settings for *Channel Configuration*, *Audio Service*, and *Language* as the track in the Sources section. If there isn't a match of settings, the output uses the first audio track from the input.



The Configure/Edit Rendition dialog provides these options (which vary depending on the selection of Video and Audio, Audio Only, or Video Only when you create a new Rendition):

- **Name**—Enter or edit the name of the Rendition.
- **Audio Tracks**—Click the **+** icon to add audio tracks.
- **Channel Configuration**—Select the audio configuration to use: Mono, Stereo, or 5.1 surround sound.
- **Audio Service**—Select the audio service label to use within the Live Stream interface: Primary, Secondary, Commentary, or Music.
- **Language**—Select the language to use for the audio track.
- **Description**—Enter a description for the Audio Track.

Adding a Segment

Click the **+** icon in a Rendition to add a Segment. Then select a Segment to add Materials to it. Multiple Segments require Trigger Conditions to declare which Segment is to be encoded at any given time.

Adding Materials

Click the **+** icon for Materials and select one of the following options to display the Configure Material dialog. Add the assets for the Segment, such as images and video materials, and adjust their size and location to the create the look you want for the overlay.

Note: A maximum of five Materials assets can be added to one Segment.

- **Source Placeholder**—The gray-bar placeholder, which is used later in the Channel section to allow selection of an input source.

  When a Source Placeholder is added, it enables the ability to select an input source in Channels for that segment. The specific Source that populates the placeholder is selected at the Channel configuration phase to allow Program configurations to be made once and used repeatedly for multiple sources, when appropriate.

  When a Program is only used to provide image or video assets that you have placed in a Segment, and doesn't need to connect to a source input, a Source Placeholder

is not needed. For example, you could have a Segment that only has the purpose of presenting an image or video asset upon Loss of Signal (LOS).

- **Source Playlist**—Select a playlist to use so that multiple video files can play. You can only use SMIL playlists. See the Playlist Example and Using Playlists below.
- **Video Asset**—Add a video asset to use in the Segment. Audio that is included with the video will not be heard or used in any way.
- **Image Asset**—Add an image to use in the Segment. Animated GIFs can be used when added as an Image Asset.

Playlist Example

The following is an example SMIL playlist for use in Materials. The <head> section that is commonly present must not be included or must be commented-out. You can also comment-out any video file that you don't want to play.

```
<?xml version="1.0" encoding="utf-8"?>
<smil xmlns="http://www.w3.org/TR/REC-smil">
   <body>
      <par>
         <video src="\\tests\TEST PROCEDURES
         \Playlisting\watermarks\TotalRecall.mov" />
      </par>
      <par>
         <video src="\\tests\TEST PROCEDURES
         \Playlisting\watermarks\Elysium.mov" />
      </par>
      <par>
         <video src="\\tests\TEST PROCEDURES
         \Playlisting\watermarks\MenInBlack3_Eng.mov" />
      </par>
   </body>
</smil>
```

Using Playlists

When using playlists, the following applies.

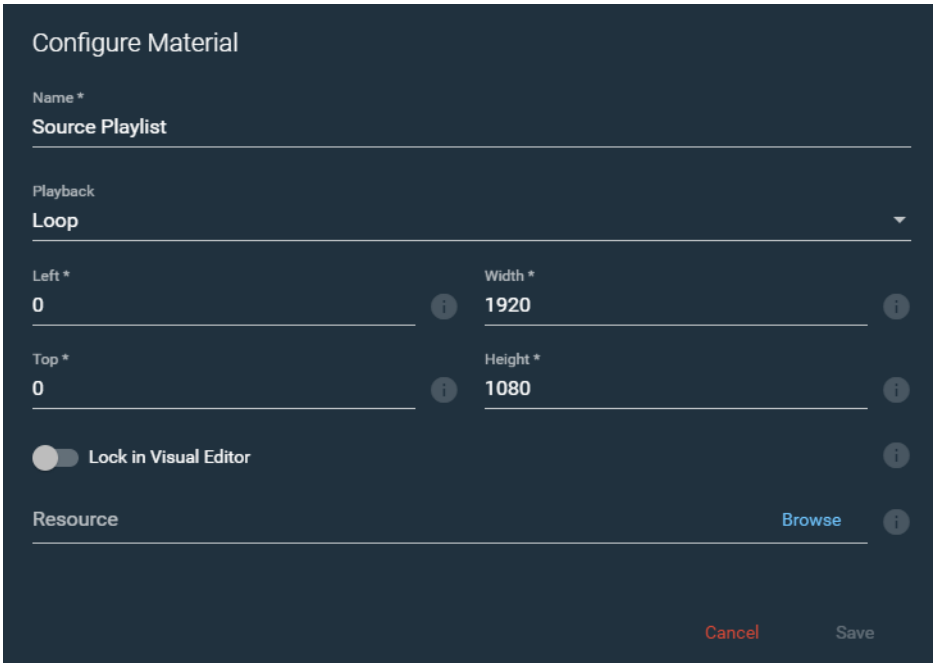
- All sources in the playlist must have matching frame rates, resolution size, and format type. For example, you can't include both H.264 and MPEG-2.
- When using the same triggered playlist multiple times in a stream, there should be a minimum of 15 seconds between the start triggers. If there is less than 15 seconds between start triggers the playlist does not restart from the beginning and will instead continue from the point where it was stopped.

  This is especially important when using the Play Once option in the Configure Material dialog, because if triggered too soon, the playlist does not have time to restart and there will only be black frames in the output (assuming that the playlist played to completion the last time it was triggered).

Image Overlay

You can apply a Video Asset or Image Asset as an overlay on your main video. Overlays can consume considerable GPU and/or CPU resources. Use caution when applying overlays, and restrict the *total combined* image area for overlays applied within active Channels to 1920x1080.

It is a better fit when the images and video clips match the source resolution and program size. When they don't match, the images may be improperly scaled and will require significant adjustment. The appearance could also be unacceptable if the image or video resolution is lower than the source.



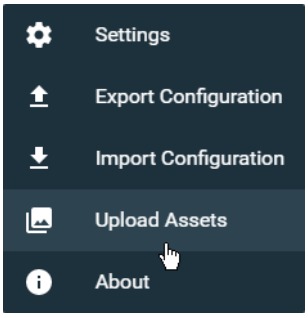
The Configure/Edit Material dialog provides these options, which vary depending on the material selected:

- **Name**—Enter or edit the name of the resource.
- **Playback**—For a Video Asset, select for playback to be Play Once or Loop.
- **Left**—The offset from the left of the screen, in pixels.
- **Width**—The display width.
- **Top**—The offset from the top of the screen, in pixels.
- **Height**—The display height.
- **Lock in Visual Editor**—Enable this to lock the material in the Visual Editor so that it cannot be resized or moved. Disable it to allow resizing or moving. When enabled, the cursor changes to a "not-allowed" version. If you edit the source material in another program it can still be resized or changed there.
- **Resource**—Click Browse to select the resource to use for this material. The resource folder location is set in the Edit Settings dialog. See Editing General Settings.

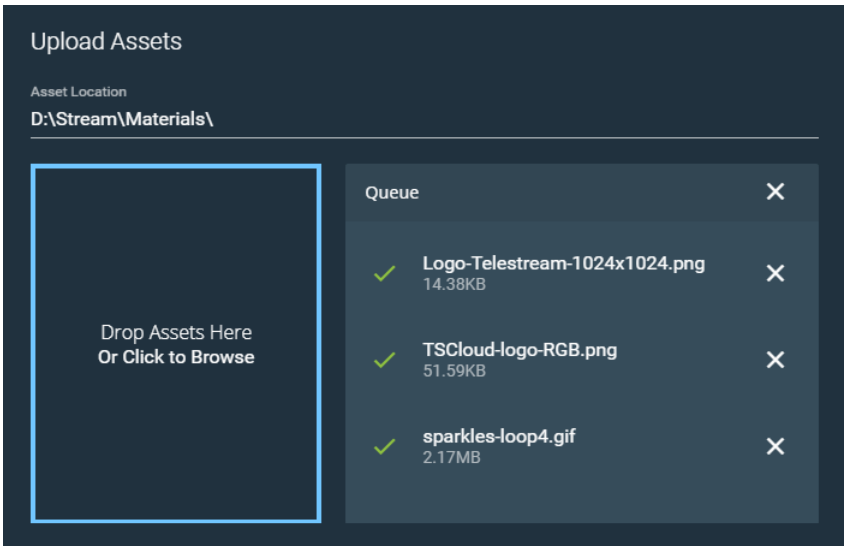
Uploading Assets for Materials

Assets that are used for Materials can be uploaded into the Asset Location folder that is set in the Editing General Settings dialog.

To open the Upload Assets dialog click the General Stream Settings icon in the upper right of the window and select *Upload Assets.*



In the Upload Assets dialog you can drop your assets into it or click in the dialog to browse and select the asset. Only supported file types can be uploaded.



A progress bar shows the level of upload completion, and you can click the X to stop the upload. You can click outside of the Upload Assets dialog to close it and the upload will continue in the background. You can re-open the Upload Assets dialog to check the status of the upload.

The supported file types are:

- SMIL (playlists)
- PNG
- TIFF
- GIF
- Animated GIF
- JPEG

- BMP
- MOV
- MP4
- TS
- MPG
- MXF

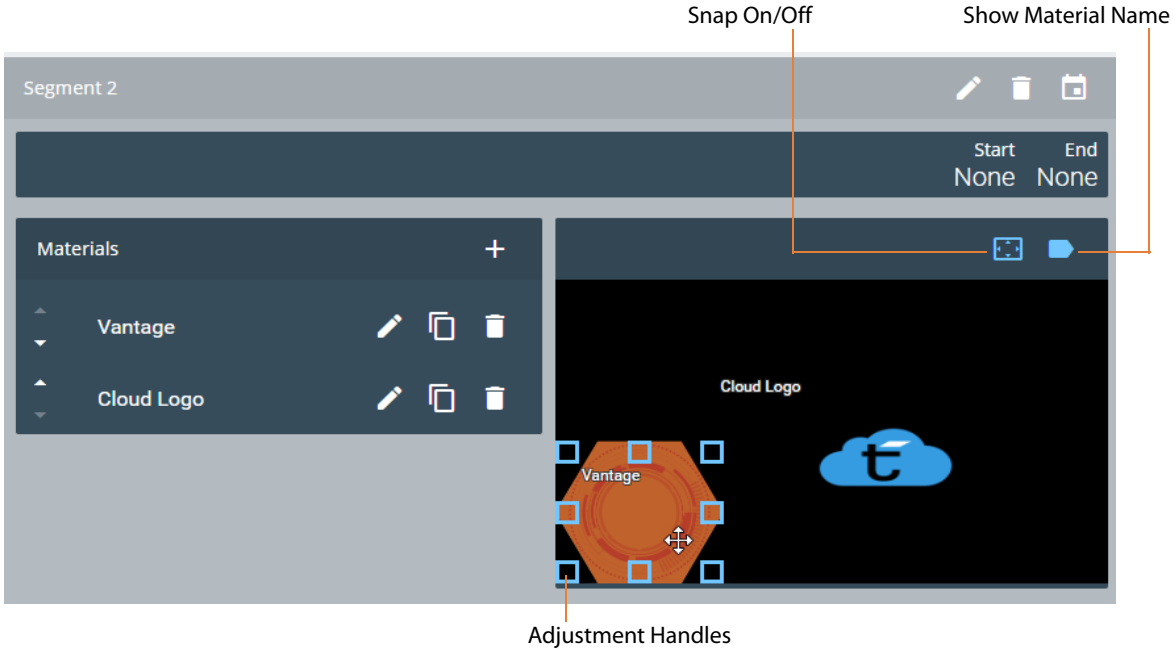
Adjusting and Editing Materials

The audio-visual assets you add are displayed in the Visual Editor to the right of the Materials menu. When you hover over an image, blue handles appear, which you can grab to adjust dimensions. Use a corner handle to resize and maintain the aspect ratio. To move an asset, grab it in a place other than a blue handle. If you don't see the adjustment handles, that asset has the *Lock in Visual Editor* setting turned on.

When Snap is active, the sides of an image snap to the edges and center of the frame. Click the Snap button to toggle Snap on and off.

Click the Material Name button to toggle the name of the materials on and off in the Visual Editor. Names displayed in the Visual Editor do not appear in the output, only in the web interface.

The most recently added asset is placed at the top of the stack but can be moved further down. To change the stacking order of assets, from front to back, use the small white arrows to change the place of a material description in the stacking order, or simply grab one of the asset descriptions to move it up or down in the list. The asset at the top of the list is the farthest in front.



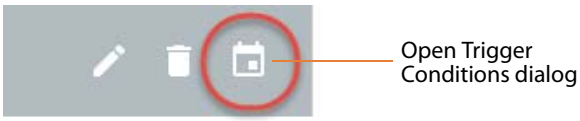
Setting Trigger Conditions

Trigger Conditions define when a Segment is active, in relation to other Segments. Trigger Conditions do not interact with operation or functions in Renditions or Channels, but only in relation to other Segments.

Note: If no Trigger Conditions are set for the Segment (set to None), the Segment is always active. The default is None.

There must be more than one Segment for Trigger Conditions to take effect. Trigger Condition settings in the top Segment (or if it is the only Segment) will not activate because there is not another Segment to interact with. For Trigger Conditions to take effect, they must be configured in a Segment (or multiple Segments) that are added below the primary, or top Segment.

Click the Trigger Conditions icon, shown below in the red circle, to open the Trigger Conditions dialog.

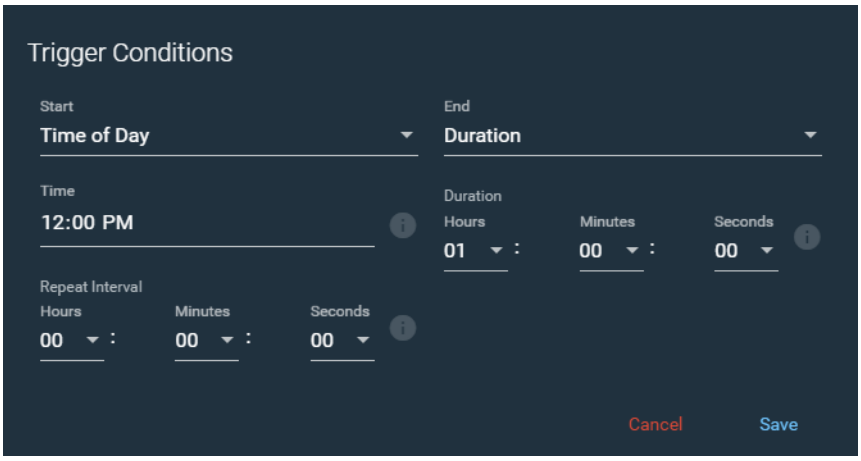


Start and End Trigger Conditions settings:

- **None**—No Trigger Conditions are set, and the Segment is always active. This is the default setting.
- **LOS**—Loss of Signal from an active Segment above it, which can trigger this Segment to become active.
- **GOS**—Gain of Signal from a higher-priority Segment above, in which case the higher-priority Segment takes over and becomes active.
- **Time of Day**—Trigger the time to start, end, or repeat the Segment. When you want to have Triggers for more than one time of day, you can create an additional Segment for each time.
  - **Time**—Sets the start and/or end time of the Trigger.
  - **Repeat Interval**—Sets the amount of time for the Trigger start to repeat. You must set a Duration for the End condition that stops the Trigger before the Repeat Interval is set to occur.

    For example, if a Trigger starts at 10:30 and has a Duration of 10 minutes then it ends at 10:40. If you want it to repeat again 5 minutes later, then the Repeat Interval is set to 15 minutes so it includes the duration of the Trigger and the

additional time to elapse for the Trigger to repeat. These settings are shown in the following image.

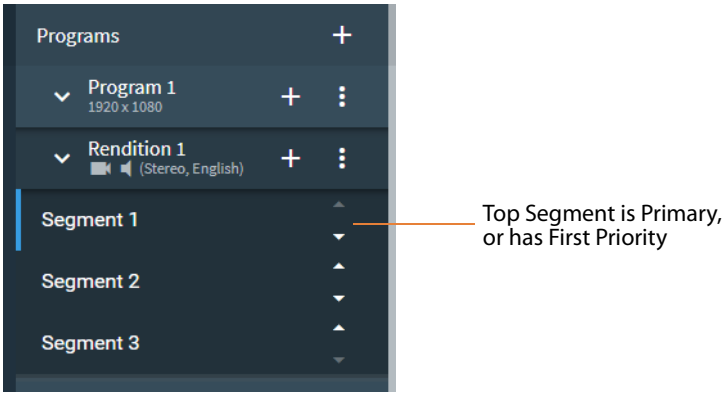


- **Duration**—For End conditions, sets the duration of the Segment. When there is a Repeat Interval the Duration should be shorter than the Repeat Interval so that the Repeat Interval starts the trigger again after the duration has elapsed.
- **SCTE-104/35**—Select the segmentation type ID of the SCTE-104/35 Insert Segmentation Descriptor command:
  - Program Start (0x10)
  - Program End (0x11)
  - Provider Ad Start (0x30)
  - Provider Ad End (0x31)
  - Distributor Ad Start (0x32)
  - Distributor Ad End (0x33)
  - Ad Break Start (0x34)
  - Ad Break End (0x35)

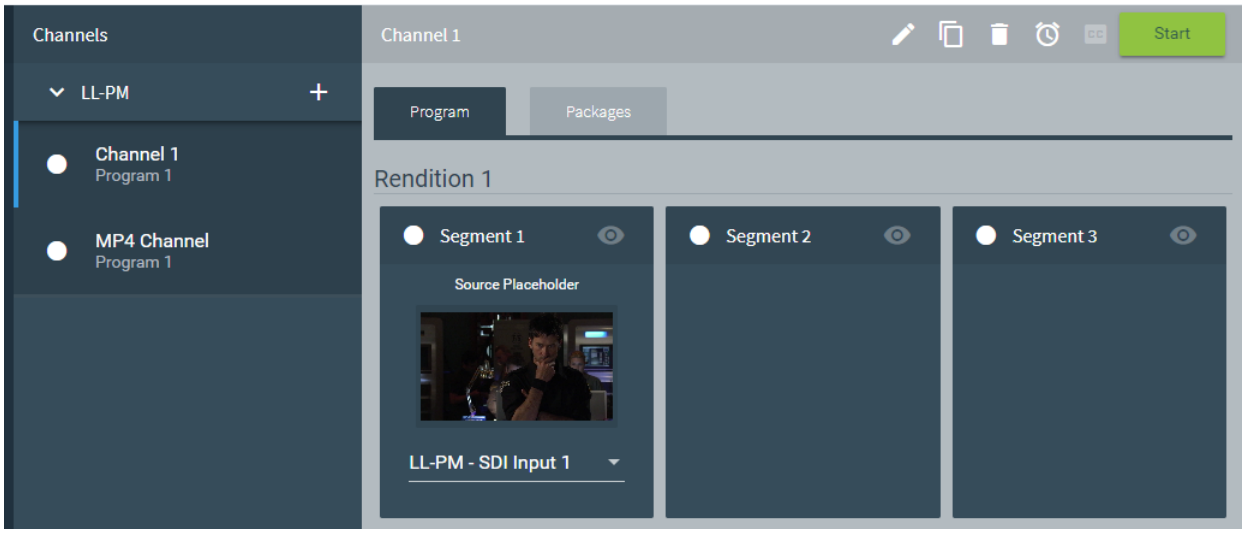
Stacking Order Determines which Segment is Primary

The visual stack order of Segments defines which segment is streamed at any given time. The highest on the stack that is active is streamed first. In other words, the top Segment has first priority, and is considered the primary Segment. Trigger settings and conditions may cause another Segment to become active first, or determine which is active next.

To change the stacking order of Segments, use the small white arrows to move them up or down, or simply grab a Segment name to move it up or down in the list.



The top Segment in the stack displays in the upper left of the Program tab in the Channels section, as shown in the image below.



Configuring Encoders

In the Encoders panel you add and edit Encoder groups. Click the + icon to add Encoder groups and click the pencil icon to edit existing Encoder groups. The Encoders panel provides options to configure the encoder parameters for the audio and video Streams. The Streams are then chosen in Package Variants.

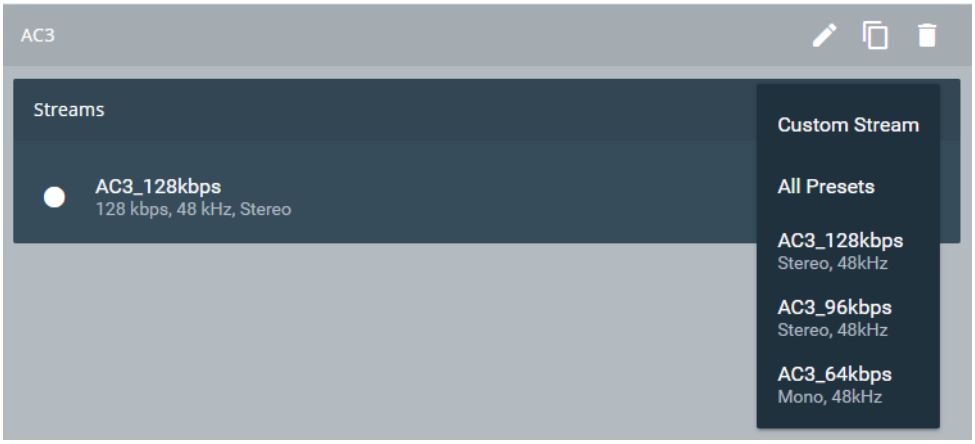
To copy an Encoder group click the Copy icon . When an Encoder is copied the word (Copy) is added to the Encoder and all Streams contained in it. You can edit them to change their names.

At least one audio Stream and one video Stream must be created and configured for each Encoder group. For each Encoder group you can add as many Streams as you need to provide all of the different settings that you want, such as unique bit rates, frame rates, and so on.

- Stream Presets for Encoders
- Adjusting GOP Settings
- AAC Audio Encoder Group
- AC3 Audio Encoder Group
- AVC Video Encoder Group
- HEVC Video Encoder Group
- YouTube Live Encoder Settings
- Facebook Live Encoder Settings
- Periscope Encoder Settings

Stream Presets for Encoders

When the *Show Encoder Stream Presets* option is enabled in the Edit Settings dialog, presets are available when adding Streams to Encoders. See Editing General Settings to enable this option.



- **Custom Streams**—Opens the Configure Stream dialog so you can create specific settings.

- **All Presets**—Adds all listed presets in Streams for that encoder. If some of the presets already exist, duplicates are added.
- **Select a Preset**—Select a specific preset to add as an available stream.

Note: If you change settings for a preset, you may want to edit the name to match the adjustments.

Adjusting GOP Settings

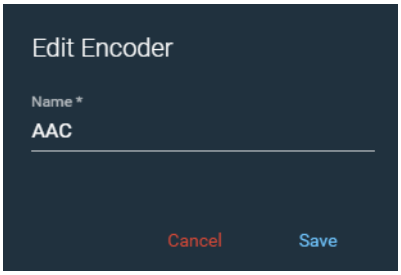
For both AVC and HEVC encoder groups, the following applies to GOP settings:

- If the GOP Length is longer than the segment duration, the segment duration becomes the GOP length.
- If a value of zero is used for the GOP Length, then the global GOP length is used, which is Segment time multiplied by the frame rate.
- Ideally, Segment duration will be a multiple of GOP duration. For example, a Segment duration of 9 seconds makes sense with a GOP duration of 3 seconds.
- GOP Length values are limited to a maximum of 255 frames for HEVC Lightspeed HW Compressor mode and 1,000 frames for other modes. Note that the frame rate and GOP Duration in seconds have an interaction.

Note: When you create an AVC or HEVC encoder, there is a GOP Length setting specified in seconds. This setting is used by default unless you turn on the GOP Length override within a Stream you create for an encoder. GOP Length units are specified in frames within the Stream settings due to the possibility that various streams could have different frame rates within the encoder.

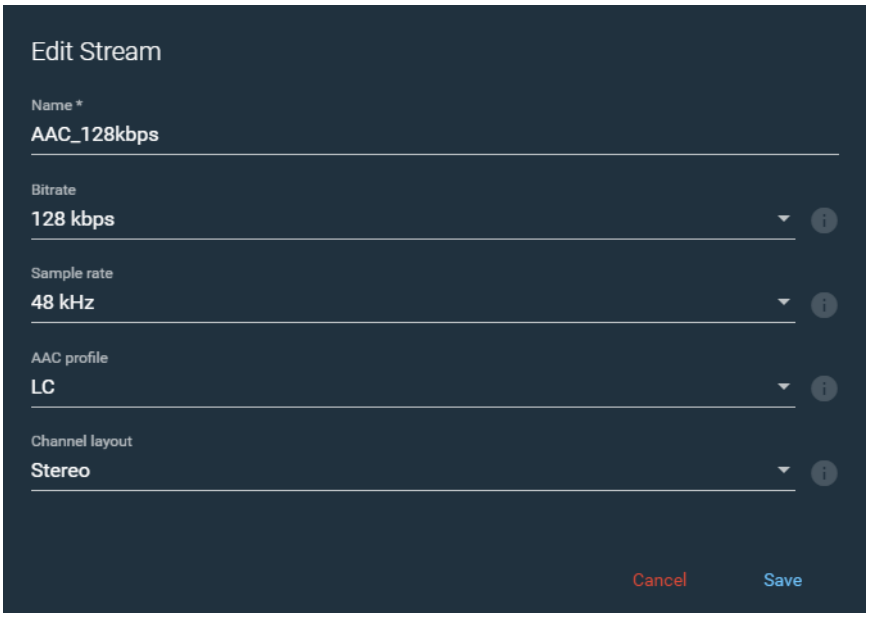
AAC Audio Encoder Group

Add the AAC encoder group or edit the name of AAC audio encoder group.



Streams for AAC Encoders

Select the AAC audio encoder group and click the **+** icon in Streams to add stream versions.

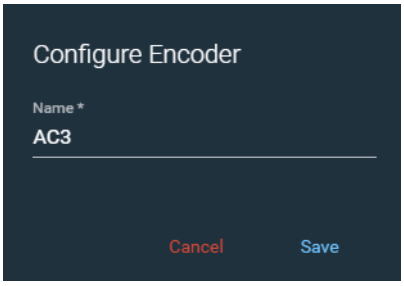


The Configure/Edit Stream dialog provides these options:

- **Name**—Enter or edit the name of the AAC stream.
- **Bitrate**—Select the AAC audio bit rate. The default is 64kbps. Select from 8kbps through 512kbps.
- **Sample Rate**—Select the AAC audio sample rate. The default is 48kHz. Select from 22.05kHz through 48kHz.
- **AAC Profile**—Select the profile of the AAC audio encoder: LC (AAC-LC - Low Complexity), HEv1 (HE-AAC - High Complexity version 1), or HEv2 (HE-AAC v2 - High Complexity version 2).
- **Channel Layout**—Select the audio layout to use for the output: Mono, Stereo, or 5.1 surround sound. This is the setting that makes the final determination of the Mono, Stereo, or 5.1output configuration.

AC3 Audio Encoder Group

Add the AC3 encoder group or edit the name of AC3 audio encoder group.



Streams for AC3 Encoders

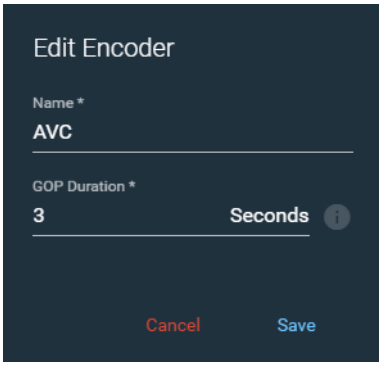
Select the AC3 audio encoder group and click the **+** icon in Streams to add stream versions.

The Configure/Edit Stream dialog provides these options:

- **Name**—Enter or edit the name of the AC3 stream.
- **Bitrate**—Select the AC3 audio bit rate. Use the following AC3 audio bit rate settings for proper encoding operation:
  - Mono must be 56 kbps or higher.
  - Stereo must be 96 kbps or higher.
  - 5.1 must be 224 kbps or higher.
- **Sample Rate**—Select the AC3 audio sample rate. The only option is 48kHz.
- **Channel Layout**—Select the audio layout to use for the output: Mono, Stereo, or 5.1 surround sound. This is the setting that makes the final determination of the Mono, Stereo, or 5.1 output configuration.

AVC Video Encoder Group

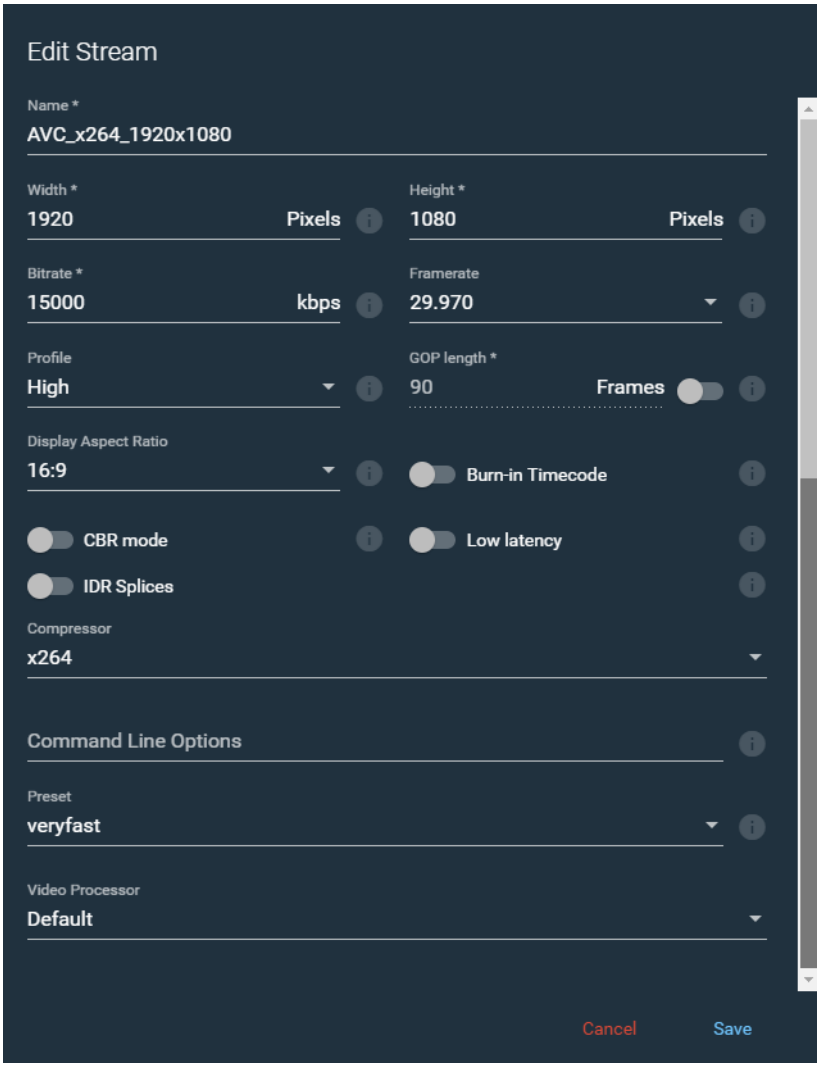
Add the AVC (Advanced Video Coding) encoder group or edit the AVC video encoder group.



- **Name**—Enter or edit the name of the AVC encoder group.
- **GOP Duration**—Enter or select the GOP duration, in seconds. The maximum duration is 30 seconds.

Streams for AVC Encoders

Select the AVC video encoder group and click the + icon in Streams to add stream versions.



The Configure Stream dialog for the AVC encoder provides these options:

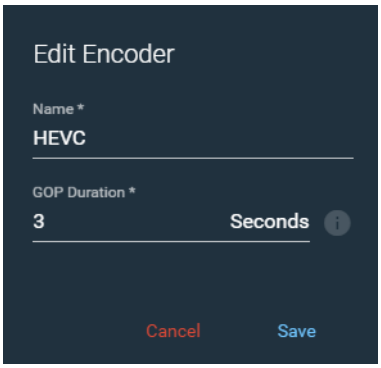
- **Name**—Enter or edit the name of the AVC stream.
- **Width**—Enter or select the stream width. The default is 1920, the minimum is 160, and maximum width is 4096 pixels.
- **Height**—Enter or select the stream height. The default is 1080, the minimum is 120, and the maximum height is 2160 pixels.
- **Bitrate**—Enter or select the stream bit rate. The default is 9000, the minimum is 100, and the maximum bitrate is 50,000kbps.
- **Framerate**—Select the stream output frame rate. The default is 30fps, and the available frame rates are 7.5, 10, 12, 12.5, 15, 23.976, 24, 25, 29.97, 30, 50, 59.94, and 60.

- **Profile**—Select the profile to use: Baseline, Main, or High.
- **GOP Length**—Enter or select the GOP length in frames. When turned on, this setting overrides the GOP duration set in the Edit Encoder dialog for this Encoder group.
- **Display Aspect Ratio**—Select the aspect ratio of the encoded stream: 4:3, 16:9, 1.85:1, 2.35:1, 2:1, 1:1, or 1.9:1.
- **Burn-in Timecode**—Composites a text representation of the timecode onto the encoded image.
- **CBR Mode**—Set Constant Bit Rate mode off or on.
- **Low Latency**—Enables low latency encoding.
- **IDR Splices**—Enable for splice frames to be IDR frames.
- **Compressor**—Select the compressor to use for the stream. The options for AVC are x264 and Lightspeed GPU. The x264 compressor uses the CPU for processing and Lightspeed GPU uses GPU processing resources.
- **Command Line Options**—Command Line parameters for x264. Only available when Advanced Mode is turned on in the Stream Settings dialog. For more information see *"Command Line (option)"* in *Appendix A* of the *Lightspeed Live Capture User Guide*.
- **Preset**—The speed preset to use for the x264 compressor. Only available when Advanced Mode is turned on in the Stream Settings dialog.
- **Video Processor**—Select the video processor to use: Default or Lightspeed. Default mode uses only the CPU. Lightspeed mode is accelerated and primarily uses the GPU. Both modes produce high-quality video.

Note: For information about how encoder settings affect server resources, see Live Stream CPU and GPU Resource Usage Guide in the next chapter.

HEVC Video Encoder Group

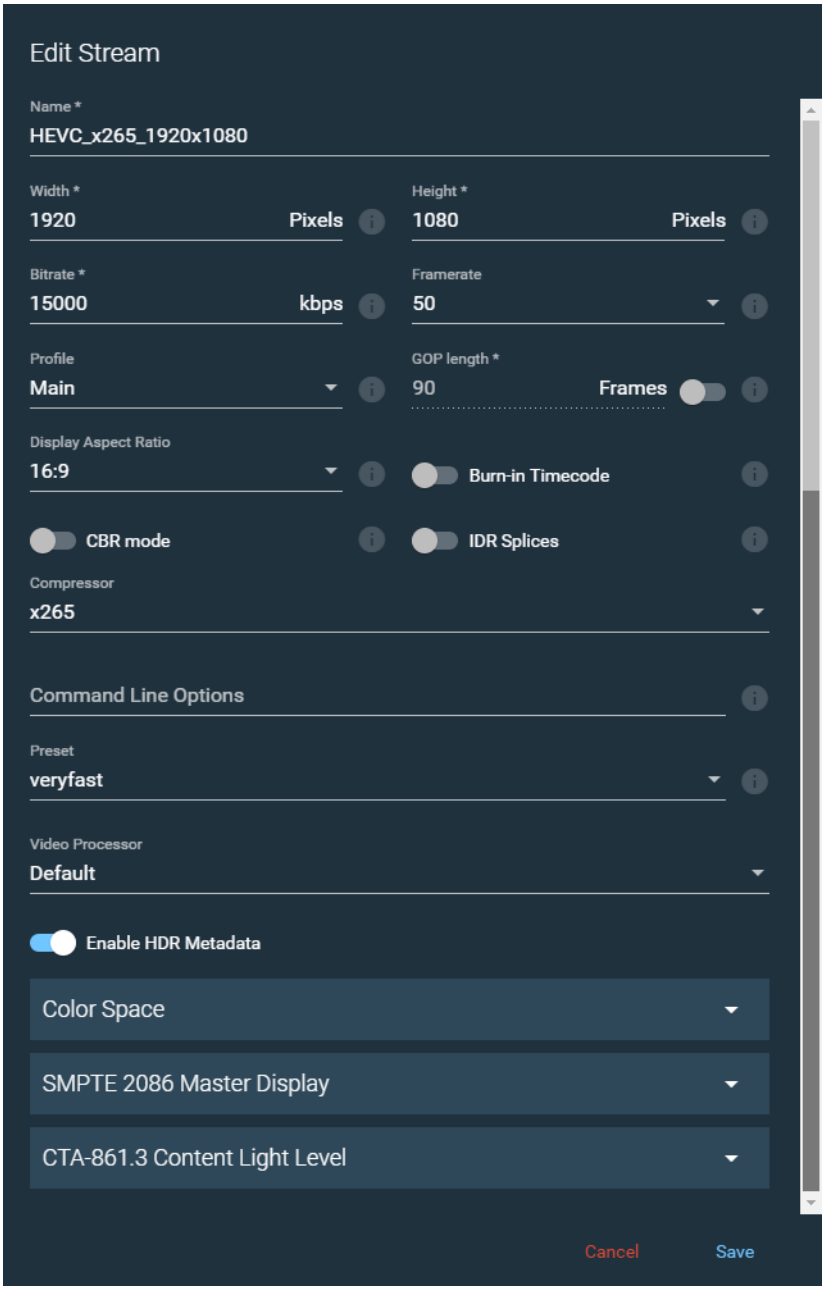
Add the HEVC (High Efficiency Video Coding) encoder group or edit the HEVC video encoder group.



- **Name**—Enter or edit the name of the HEVC encoder group.
- **GOP Duration**—Enter or select the GOP duration, in seconds. The maximum duration is 30 seconds.

Streams for HEVC Encoders

Select the HEVC encoder group and click the + icon in Streams to add stream versions.



The Configure/Edit Stream dialog for the HEVC encoder provides these options:

- **Name**—Enter or edit the name of the HEVC stream.

- **Width**—Enter or select the stream width. The default is 1920, the minimum is 160, and maximum width is 4096 pixels.
- **Height**—Enter or select the stream height. The default is 1080, the minimum is 120, and the maximum height is 2160 pixels.
- **Bitrate**—Enter or select the stream bit rate. The default is 9000, the minimum is 100, and the maximum bitrate is 50,000kbps.
- **Framerate**—Select the stream output frame rate. The default is 30fps, and the available frame rates are 7.5, 10, 12, 12.5, 15, 23.976, 24, 25, 29.97, 30, 50, 59.94, and 60fps. The frame rate is limited when using the Lightspeed HW compressor, see YouTube Live Encoder Settings below.
- **Profile**—Select Main for 8-bit and Main 10 for 10-bit output. When using Main 10, the Video Processor selected must be Lightspeed. When Main (8-bit) is selected you can use either the Default or the Lightspeed Video Processor.
- **GOP Length**—Enter or select the GOP length in frames. When turned on, this setting overrides the GOP duration set in the Edit Encoder dialog for this Encoder group.
- **Display Aspect Ratio**—Select the aspect ratio of the encoded stream: 4:3, 16:9, 1.85:1, 2.35:1, 2:1, 1:1, or 1.9:1.
- **Burn-in Timecode**—Composites a text representation of the timecode onto the encoded image.
- **CBR Mode**—Set Constant Bit Rate mode off or on.
- **IDR Splices**—Enable for splice frames to be IDR frames.
- **Compressor**—Select the compressor to use for the stream. The options for HEVC are x265, Lightspeed GPU, and Lightspeed HW.

Note: When Lightspeed HW is selected for the HEVC Compressor setting, the optional HEVC card is used for the output. The HEVC card is not used when x265 or Lightspeed GPU is selected for the Compressor setting. Lightspeed HW mode is only functional when the optional HEVC card is installed in the Lightspeed server.

Note: To use Lightspeed GPU mode for 10-bit output (Profile: Main 10), the Lightspeed Live server must have an NVIDIA Pascal Generation GPU, such as Tesla P4, installed. When a Tesla M4 GPU is installed, streaming operation will fail when using the Lightspeed GPU mode. To see which GPU is installed, go to Device Manager > Display Adapters > NVIDIA Tesla [P4 or M4].

- **Command Line Options**—Command Line parameters for x265. Only available when Advanced Mode is turned on in the Stream Settings dialog. For more information see *"Command Line (option)"* in *Appendix A* of the *Lightspeed Live Capture User Guide*.

- **Preset**—The speed preset to use for the x265 compressor. Only available when Advanced Mode is turned on in the Stream Settings dialog. When used for 4K output, the recommended Preset to use is either "ultrafast" or "superfast".
- **Video Processor**—Select the video processor to use: Default or Lightspeed. Default mode uses only the CPU. Lightspeed mode is accelerated and primarily uses the GPU. Both modes produce high-quality video.
- **Enable HDR Metadata**—Enables the ability to set the following HDR metadata options:
  - **Color Space**—Set options for Color Primaries, Transfer Characteristics, and Color Matrix.
  - **SMPTE 2086 Master Display**—Set values for X and Y Chromaticity Coordinates for Red, Green, Blue, and White Point, as well as Maximum and Minimum Luminance in units of candelas per square meter.
  - **CTA-861.3 Content Light Level**—Set Maximum Content Light Level (MaxCLL) in units of candelas per square meter and Maximum Content Light Level (MaxFALL) in units of candelas per square meter.

Note: For information about how encoder settings affect server resources, see Live Stream CPU and GPU Resource Usage Guide in the next chapter.

YouTube Live Encoder Settings

For YouTube Live, only 30 or 60 frames per second (fps) are allowed and only specific resolution sizes and bitrate ranges can be used. When you choose the quality of your stream, YouTube automatically creates all of the lower quality versions. The following table lists the encoder configurations allowed for YouTube Live.

Type	Resolution	fps	Bitrate Range (kbps)
2160p @30fps	3840x2160	30	13,000 - 34,000
2160p @60fps	3840x2160	60	20,000 - 51,000
1440p @30fps	2560x1440	30	6,000 - 13,000
1440p @60fps	2560x1440	60	9,000 - 18,000
1080p @30fps	1920x1080	30	3,000 - 6,000
1080p @60fps	1920x1080	60	4,500 - 9,000
720p @30fps	1280x720	30	1,500 - 4,000
720p @60fps	1280x720	60	2,250 - 6,000
480p @30fps	854x480	30	500 - 2,000
360p @30fps	640x360	30	400 - 1,000
240P @30FPS	426X240	30	300 - 700

- **Audio for YouTube Live**—The recommended audio sample rate is 44.1kHz and audio bitrate is 128 kbps stereo.

Facebook Live Encoder Settings

These settings are accepted or recommended by Facebook Live:

- Maximum resolution of 1280 x 720 (720p) at 30 frames per second (fps), H264.
- Maximum video bit rate of 4000 kbps.
- AAC audio with these settings:
  - 44.1kHz sample rate.
  - 128 kbps bit rate.
  - Mono channel layout.

When you have preset encoders enabled you can choose the Facebook Live presets that already provide the recommended settings. See Stream Presets for Encoders.

Periscope Encoder Settings

Settings recommended by Periscope are provided as an AVC encoder preset. Use the AVC encoder and choose the “Periscope_AVC_960x540_30fps” preset. The “Show Encoder Stream Presets” option must be enabled in the Edit Settings menu for the presets to be available. See Editing General Settings.

Configuring Packages

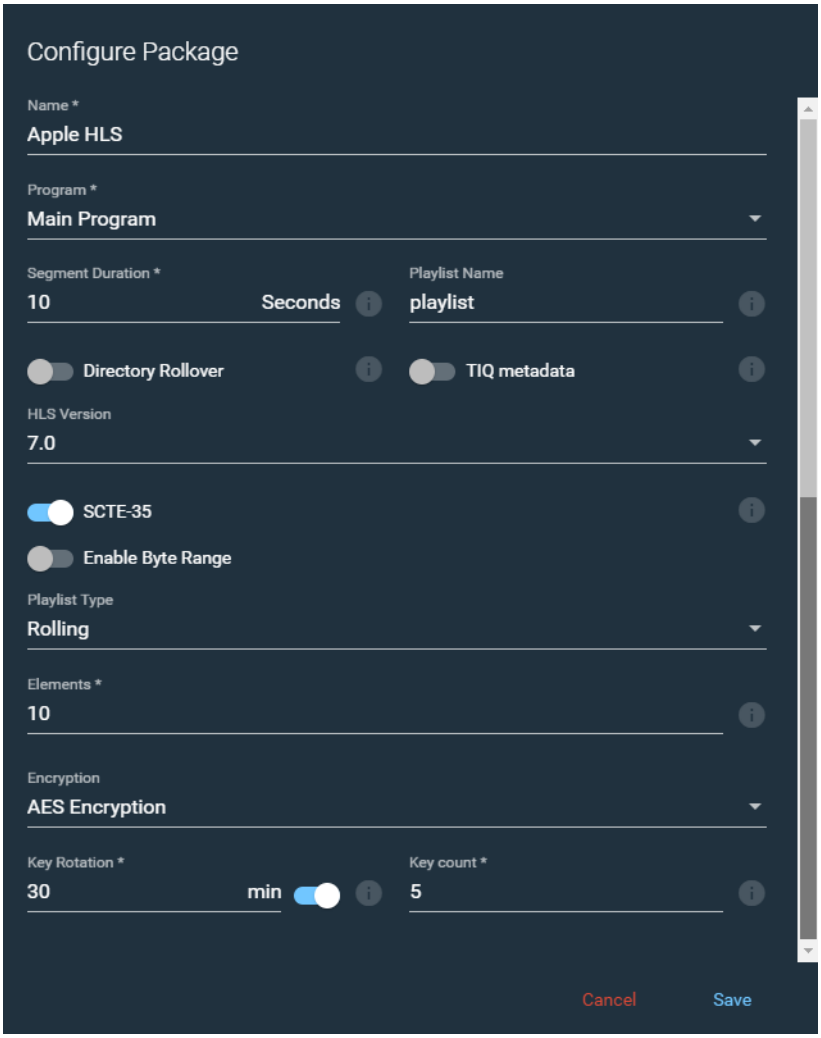
In the Packages panel you add and edit Packages. Click the + icon to add Packages and click the pencil icon to edit selected existing Packages. The Packages section allows you to choose the type of packages you want to use (such as Apple HLS, DASH, and so on) select a Program to use with the Package, and configure package settings.

Variants are added, in which you select Renditions and Encoder Streams to use for each Variant of the Package. At least one Variant must be included for each Package.

- Apple HLS Packages
- ATS (Adaptive Transport Stream)
- DASH Packages
- CMAF Packages
- RTMP Packages
- RTMP Azure Packages
- MP4 Packages
- YouTube Live Packages
- Facebook Live Packages
- Periscope Packages
- Adding and Configuring Variants

Apple HLS Packages

Configure or Edit an Apple HLS package.



The Configure/Edit Package dialog for Apple HLS provides these options:

- **Name**—Enter or edit the name of the Apple HLS package.
- **Program**—Select the program to use for this package from the list you created in the Programs section.
- **Segment Duration**—Enter or select the seconds of segment duration. Segment duration should be a multiple of GOP duration and will determine the frequency at which players may switch Variants. Lower segment durations can reduce latency.
- **Playlist Name**—Enter the name to use for the playlist.
- **Directory Rollover**—Roll segments over to a new folder at 5-hour intervals.

- **TIQ Metadata**—Enable to add Telestream metadata to the package for usage by quality analysis systems. Timestamps for use by IneoQuest products are included. When enabled, the output HLS is forced to HLS version 7.0, even when you have selected 3.0 or 4.0 for the HLS version in the Package.
- **HLS Version**—Select the HLS version to use, 3.0, 4.0, or 7.0. The default is version 4.0. Some devices, such as certain TV models, require HLS 3.0. When 7.0 is selected, it includes the option to add SCTE-35 segmentation date-range lines. The default for SCTE-35 date-range lines is enabled.
- **Enable Byte Range**—When enabled, the EXT-X-BYTERANGE feature of HLS is used and there is a single .ts file for the entire stream. When disabled (default), the output is the normal multiple .ts segments, and the *Playlist Type* and *Elements* settings are needed.
- **Playlist Type**—Select the playlist type to use, Rolling or Appending:
  - The Rolling playlist keeps a specific number of Segments, set in Elements. Rolling playlists will keep a fixed pool of published Segments, which reduces storage management and constrains player access to a range of Segments.
  - The Appending playlist keeps all Segments. Appending playlists store all Segments encoded while the Channel is active and can be used to generate VOD assets for library storage.
- **Elements**—Enter or edit the number of elements to keep in the Rolling Playlist. The minimum number of elements is 5 and the maximum is 100.

Note: When *Byte Range* is enabled, the *Playlist Type* and *Elements* settings are not active and have no effect on the output.

- **Encryption**—Select the encryption type to use: None, AES Encryption, or Verimatrix DRM. (A Verimatrix server must be available in order to use Verimatrix DRM.)
- **Key Count**—For AES Encryption, sets the number of keys that are automatically generated and rotated-over when encrypting this HLS stream.
- **Server URL**—For Verimatrix DRM, the server address.
- **Key Rotation**—For Verimatrix DRM, sets the key rotation time.
- **Create Key File**—For Verimatrix DRM, when enabled this creates a file with encryption keys. This is needed if the Package is processed by the ABR Optimize action.

ATS (Adaptive Transport Stream)

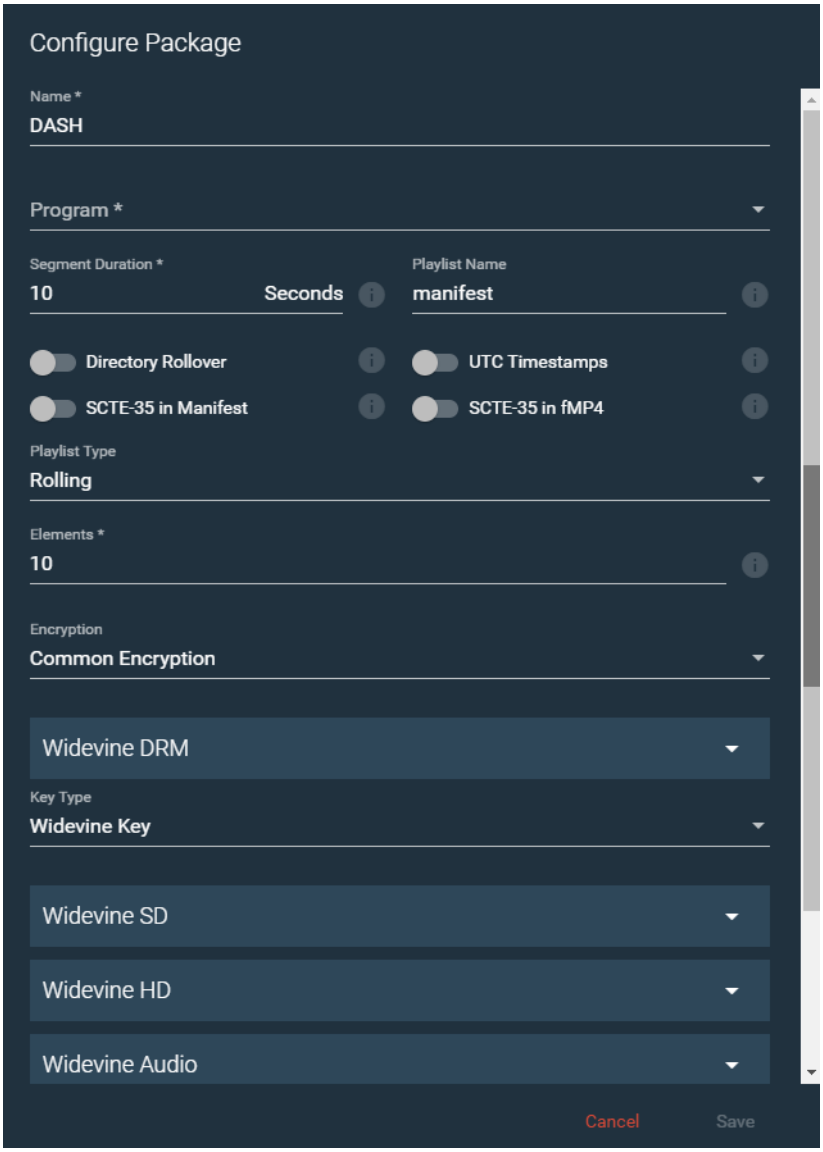
Configure or Edit an ATS (Adaptive Transport Stream) package.

The Configure/Edit Package dialog provides these options:

- *Name*—Enter or edit the name of the ATS package.
- *Program*—Select the program to use for this package from the list you created in the Programs section.

DASH Packages

Configure or Edit a DASH package.



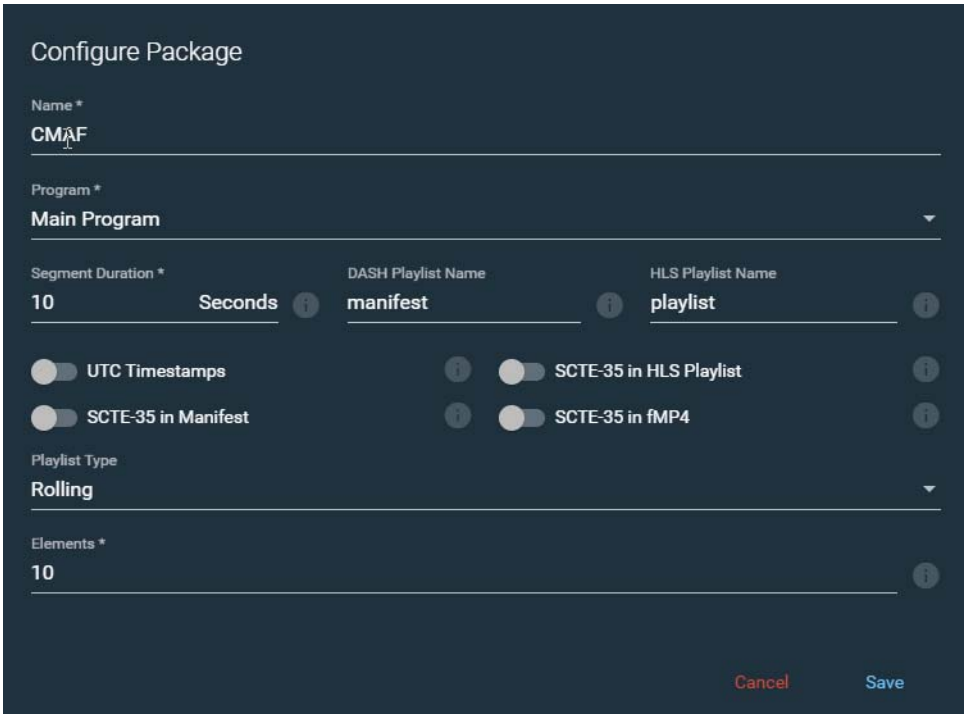
The Configure/Edit Package dialog for DASH provides these options:

- **Name**—Enter or edit the name of the DASH package.
- **Program**—Select the program to use for this package from the list you created in the Programs section.
- **Segment Duration**—Enter or select the seconds of segment duration. Segment duration should be a multiple of GOP duration and will determine the frequency at which players may switch Variants. Lower segment durations can reduce latency.
- **Playlist Name**—Enter the name of the playlist.
- **Directory Rollover**—Roll segments over to a new folder at 5-hour intervals.

- **UTC Timestamps**—Changes the timestamps in the movie fragments to be based on UTC time. Enabling this option provides UTC timestamps for delivery to Unified Streaming's Origin content delivery system.
- **STCE-35 in Manifest**—Add SCTE-35 event stream tag.
- **STCE-35 in fMP4**—Add SCTE-35 metadata track to fragmented MP4 files.
- **Playlist Type**—Select the playlist type to use, Rolling or Appending:
  - The Rolling playlist keeps a specific number of Segments, set in Elements. Rolling playlists will keep a fixed pool of published Segments, which reduces storage management and constrains player access to a range of Segments.
  - The Appending playlist keeps all Segments. Appending playlists store all Segments encoded while the Channel is active and can be used to generate VOD assets for library storage.
- **Elements**—Enter or edit the number of elements to keep in the Rolling Playlist.
- **Encryption**—Select Unencrypted, From Script, or Common Encryption. For Script encryption, enter the Script to use. For Common Encryption, the following options are available for Widevine DRM and Key Types:
  - **Widevine DRM**—Enter the Provider and Content Identifier.
- **Key Type, Widevine Key**—Provide the information for the Widevine Keys you want to include:
  - **WidevineSD**—Enter the Key Identifier and Key Value.
  - **WidevineHD**—Enter the Key Identifier and Key Value.
  - **WidevineAudio**—Enter the Key Identifier and Key Value.
  - **PlayReady DRM**—Enter the Key Identifier, Key Value, Key Seed, and License acquisition URI.
  - **Clear Key DRM**—Enter the Key Identifier and Key Value.
  - **GPAC DRM**—Enter the Key Identifier and Key Value.
- **Key Type, Foreign Key**—Enter the Key Identifier and Key Value, and then enter information additional Foreign Key data you want to include:
  - **PlayReady DRM**—Enter the Key Identifier, Key Value, Key Seed, and License acquisition URI.
  - **Clear Key DRM**—Enter the Key Identifier and Key Value.
  - **GPAC DRM**—Enter the Key Identifier and Key Value.

CMAF Packages

Configure or Edit a CMAF (Common Media Application Format) package.



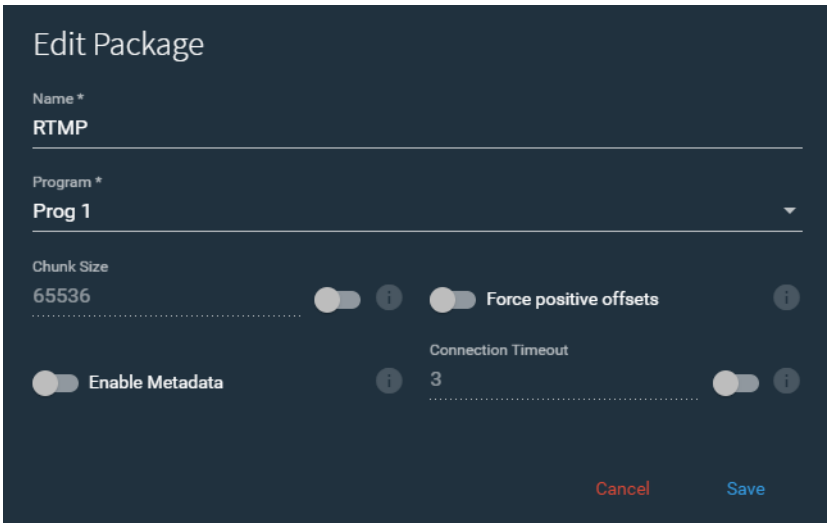
The Configure/Edit Package dialog provides these options:

- **Name**—Enter or edit the name of the CMAF package.
- **Program**—Select the program to use for this package from the list you created in the Programs section.
- **Segment Duration**—Enter or select the seconds of segment duration. Segment duration should be a multiple of GOP duration and will determine the frequency at which players may switch Variants. Lower segment durations can reduce latency.
- **DASH Playlist Name**—Enter the name of the DASH playlist.
- **HLS Playlist Name**—Enter the name of the HLS master playlist.
- **UTC Timestamps**—Changes the timestamps in the movie fragments to be based on UTC time. Enabling this option provides UTC timestamps for delivery to Unified Streaming's Origin content delivery system.
- **STCE-35 in HLS Playlist**—Add SCTE-35 segmentation date-range lines to HLS index playlist.
- **STCE-35 in Manifest**—Add SCTE-35 event stream tag to DASH manifest.
- **STCE-35 in fMP4**—Add SCTE-35 metadata track to fragmented MP4 files.

- **Playlist Type**—Select the playlist type to use, Rolling or Appending:
  - The Rolling playlist keeps a specific number of Segments, set in Elements. Rolling playlists will keep a fixed pool of published Segments, which reduces storage management and constrains player access to a range of Segments.
  - The Appending playlist keeps all Segments. Appending playlists store all Segments encoded while the Channel is active and can be used to generate VOD assets for library storage.
- **Elements**—Enter or edit the number of elements to keep in the Rolling Playlist.

RTMP Packages

Configure or Edit an RTMP package.



The Configure/Edit Package dialog provides these options:

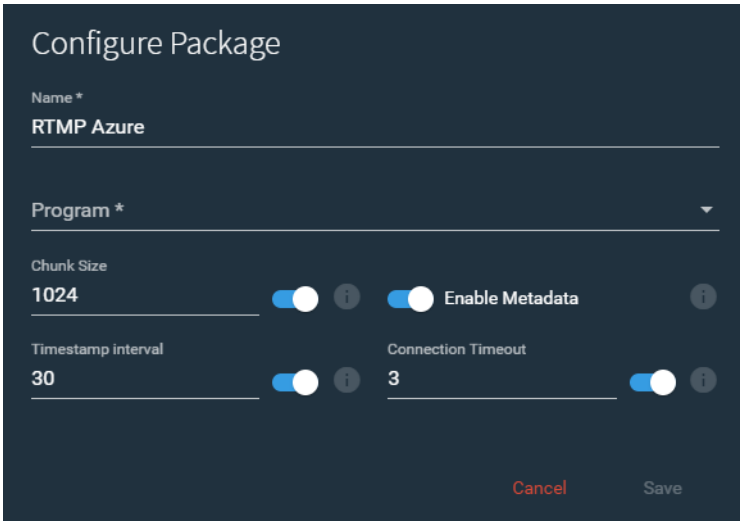
- **Name**—Enter or edit the name of the RTMP package.
- **Program**—Select the program to use for this package from the list you created in the Programs section.
- **Chunk Size**—Sets the RTMP stream to send a “Set Chunk Length” message. The default is disabled.
- **Force positive offsets**—When enabled, the RTMP stream will have positive offsets. This can improve stream operation when bframes are included in the RTMP stream. The default is disabled (negative offsets).

Note: To remove bframes from an RTMP stream, you can use the command line parameter --bframes 0. Command Line options are only available for x264 and x265 compressors. For command line parameter entry, see **Command Line Options** in Streams for AVC Encoders.

- **Enable Metadata**—When enabled, the RTMP stream will pass proprietary metadata. This setting is required if SCTE information needs to be propagated within the RTMP stream.
- **Connection Timeout**—When enabled, the stream output waits the specified number of seconds for a connection to establish before stopping the attempt. The default is 3 seconds. This option may be helpful if there are firewall delays or other conditions that can cause connection delays.

RTMP Azure Packages

Configure or Edit an RTMP Azure package, for output to Microsoft Azure.

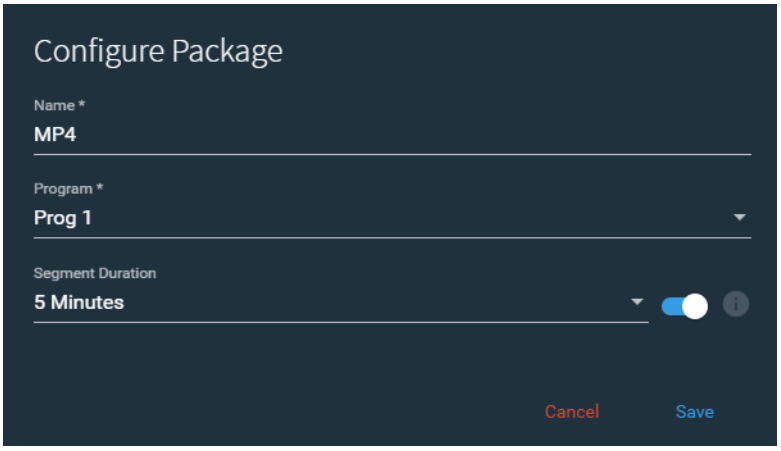


The Configure/Edit Package dialog provides these options:

- **Name**—Enter or edit the name of the RTMP Azure package.
- **Program**—Select the program to use for this package from the list you created in the Programs section.
- **Chunk Size**—Enable for the RTMP stream to send a “Set Chunk Length” message. The default is disabled. Set the chunk size as needed. The default size is 1024.
- **Enable Metadata**—When enabled, the RTMP Azure stream will pass proprietary metadata. This setting is required if SCTE information needs to be propagated within the RTMP Azure stream.
- **Timestamp Interval**—When enabled, a UTC Timestamp is emitted at the specified interval of frames. The default is every 30 frames.
- **Connection Timeout**—When enabled, the stream output waits the specified number of seconds for a connection to establish before stopping the attempt. The default is 3 seconds. This option may be helpful if there are firewall delays or other conditions that can cause connection delays.

MP4 Packages

Configure or Edit an MP4 package.



The Configure/Edit Package dialog provides these options:

- **Name**—Enter or edit the name of the MP4 package.
- **Program**—Select the program to use for this package from the list you created in the Programs section.
- **Segment Duration**—Enable to break the recorded output into MP4 segments of the selected duration. Each created segment is complete and usable. While the Stream is active, segments of the selected duration will continue to be created. The duration options are 5, 10, 15, 20, 30 minutes, and 1 hour. The default is 5 minutes.

YouTube Live Packages

Configure or Edit a YouTube Live package.

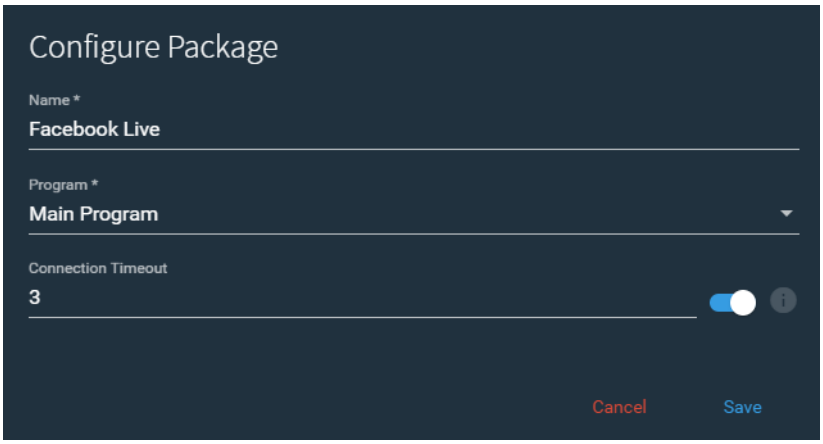
The Configure/Edit Package dialog provides these options:

- **Name**—Enter or edit the name of the YouTube Live package.
- **Program**—Select the program to use for this package from the list you created in the Programs section.

- **Connection Timeout**—When enabled, the stream output waits the specified number of seconds for a connection to establish before stopping the attempt. The default is 3 seconds. This option may be helpful if there are firewall delays or other conditions that can cause connection delays.

Facebook Live Packages

Configure or Edit a Facebook Live package.

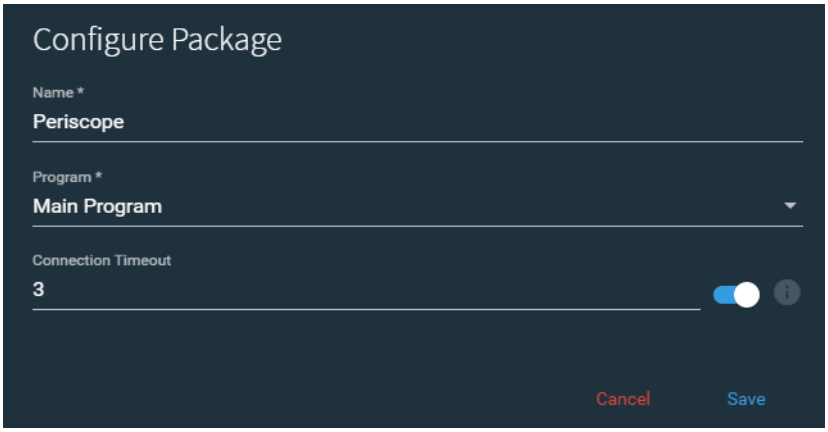


The Configure/Edit Package dialog provides these options:

- **Name**—Enter or edit the name of the Facebook Live package.
- **Program**—Select the program to use for this package from the list you created in the Programs section.
- **Connection Timeout**—When enabled, the stream output waits the specified number of seconds for a connection to establish before stopping the attempt. The default is 3 seconds. This option may be helpful if there are firewall delays or other conditions that can cause connection delays.

Periscope Packages

Configure or Edit a Periscope package.



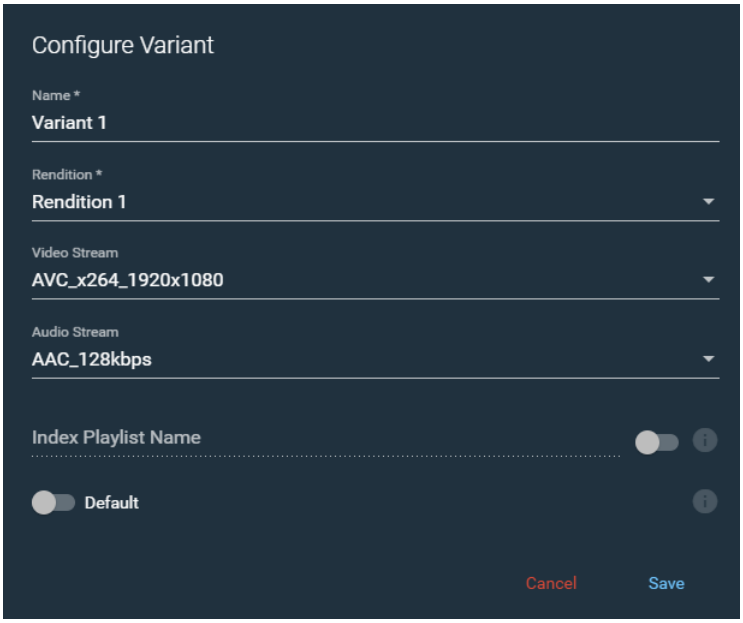
The Configure/Edit Package dialog provides these options:

- **Name**—Enter or edit the name of the Periscope package.
- **Program**—Select the program to use for this package from the list you created in the Programs section.
- **Connection Timeout**—When enabled, the stream output waits the specified number of seconds for a connection to establish before stopping the attempt. The default is 3 seconds. This option may be helpful if there are firewall delays or other conditions that can cause connection delays.

Adding and Configuring Variants

Select a Package and click the **+** icon in Variants to add and configure a Variant. You can add multiple Variants. In a Variant you select a Rendition and the audio and video Encoder Streams to use for each Variant of the Package.

Note: Streams using HEVC encoders, when running in Lightspeed HW compressor mode, are limited to running four SD/HD Variants or one UHD/4K Variant at one time. Additional HEVC Streams can't be started, due to reaching the limit.



The Configure/Edit Variant dialog provides these options:

- **Name**—Enter or edit the name of the Variant.
- **Rendition**—Select the name of the Rendition to use from one that you created in the Programs section.
- **Video Stream**—Select a video stream to use, from the ones you created in the Encoders section.
- **Audio Stream**—Select an audio stream to use, from the ones you created in the Encoders section.
- **Index Playlist Name**—Enable, then enter the name of the index playlist file which contains the URLs of the media segment files.
- **Default**—Sets this as the first Variant to be chosen by the player to play from the first segment, when the Package is HLS or DASH.

Note: The *Default* setting is respected and used by some players, but not all.

YouTube Live Variants

When creating a Package for YouTube Live you can only have *one* Variant per YouTube Live Package.

Configuring Channels

Each stream that you create in Channels can include from one to six Packages, which allows each Channel to have outputs at one or more locations. You select an input source for each Segment that is included in the Channel. When you select a Package, the Variant(s) assigned to it in the Packages section are displayed in the Variants list.

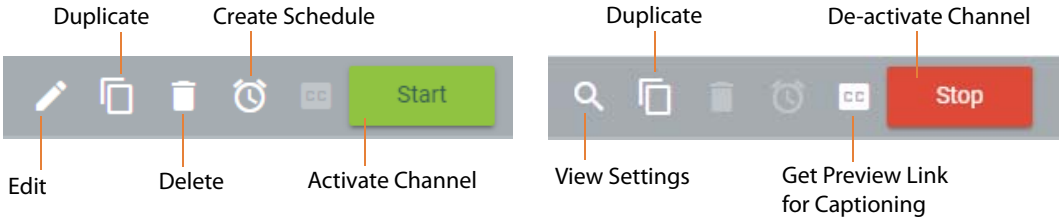
When you start the Channel, the active Source is encoded to the Package Variant definitions and delivered to the locations you have specified. When a Stream is active, an updating thumbnail preview is displayed for each Variant, as well as statistics for the resources being used.

- Channel Configuration
- Output Location Options
- HLS Stream Playback
- RTMP Channel Configuration
- YouTube Live Channel Configuration
- Facebook Live Channel Configuration
- Periscope/Twitter Channel Configuration
- Selecting the Input Source for a Segment
- Multiple Renditions or Segments
- Scheduling Channel Activation Events
- Starting and Stopping a Channel
- Previewing the Output of the Channel
- Activated Channel Operation

Channel Controls

Click the + icon to open the Configure Channel dialog to add a Channel.

The following controls are available when the selected Channel is *not* active, and *is* in the active state:

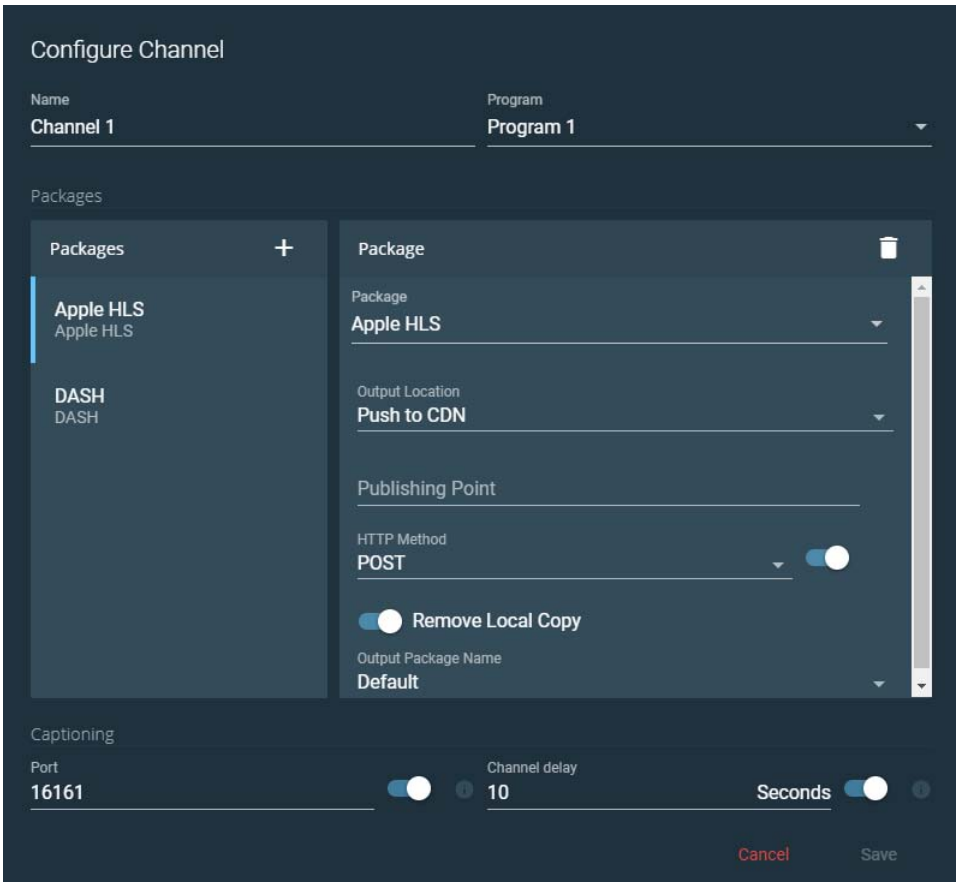


Click the Duplicate icon to duplicate the selected Channel and settings. You can duplicate an active channel, but the new copy is not active until you start it.

Click the Closed Captioning icon to access a URL to view the Captioning Channel Preview. See Using Live Captioning Input via IP for more information.

Note: A Captioning Stenographic Input entitlement must be added to your license for the live captioning input features to be visible and active.

Channel Configuration



- **Name**—Enter or edit the name of the Channel.
- **Program**—Select the Program to use for the Channel.
- **Packages**—Click the **+** icon to add Packages to the Channel, then select the Package to use and set the options for each Package.
- **Output Location**—Select the Output Location for each Package and enter information as required for File Path, Publishing Point, and so on. See Output Location Options below for details.

- **Remove Local Copy**—When enabled, removes local copy of HLS or DASH Package files after they are successfully posted to the CDN.

  The number of Segments specified in a Package for Elements of the Rolling Playlist are retained. When the maximum number of Elements specified in the Package settings is reached, the oldest Segment that has been uploaded is removed.

  When you use the default Rolling setting in Packages, that setting takes precedence and the locally stored Segments only get deleted when the Rolling limit is reached or the Channel is stopped.

  When you use the Appending option for the Playlist Type in the Package settings, all Segments are immediately removed after they are posted to the CDN.
- **Output Package Name**—Use the Default Name or set a Custom Name. The Default Name is the Channel Name. For the Custom Name, type in the Base Name and select if you want to add the Date/Time to the Base Name for the final output Package name.
- **Output File Name (for MP4)**—When using an MP4 Package, you can configure the output file name. When no Base Name is specified the Variant name is used.
  - **Base Name**—Enter the name to use for the base file name. When specified, this replaces the Variant name.
  - **Attach Date/Time**—Enable for the date and time to be added to the file name. The date/time is added to either the Base Name or the Variant name.
- **Captioning**—Settings for live captioning input. The captions will be encoded into the channel output.
  - **Port**—The IP port for the captioning input. Enable to activate the live captioning feature, and set the port number to use.
  - **Channel Delay**—When enabled, applies a delay, in seconds, to the program output before encoding. Enter the number of seconds for the delay. This delay occurs *after* the Captioning Preview and *before* the stream is sent out in order to provide the time needed to create and add the captions to the input feed.

Live Captioning Input

See Using Live Captioning Input via IP for information about accessing the Captioning Preview and more information about live captioning.

YouTube Configurations

For information about YouTube options in the Configure Channel dialog, see Creating a YouTube Live Stream Channel.

Output Location Options

Output Location options are provided for the Package types of DASH, HLS, MP4, and YouTube Live. The Output Location of *Local Origin Server* is selected by default. The options will vary depending on the Package type.

Select from the following Output Locations:

Local Origin Server

The Local Origin Server contains no selectable options and automatically defaults to the following:

- **Default File Path**—Files are written to a folder with the Channel Name at the Lightspeed Live's Local Origin Server web root folder:

  D:\Stream\<channel name>

  For example, if your Channel Name is MyHLSChannel, the File Path is—

  D:\Stream\MyHLSChannel\

- **Default Publishing Point**—The Publishing Point URL uses the *Local Origin Server's* port 8089 and has the following form:

  http://<local server name>*:8089/webroot/*<channel name>*/playlist.m3u8*

  For example, if your Local Server Name is MyCaptureServer and your Channel Name is MyHLSChannel, the Publishing Point is—

  http://MyCaptureServer:8089/webroot/MyHLSChannel/playlist.m3u8

Note: Port 8089 is the default when installed, but changes when the App Server Port is changed.

File Server

- **File Path**—Specify a folder path location on your File Server to act as the root for the package files. Files are written to a folder at this location with the Channel Name, for example:

  \\[FileServer]\[Shared Location]\<channel name>

  or

  D:\[File Server Root]\<channel name>

- **Publishing Point**—The URI where the package can be accessed. Publishing Point allows the user to specify a base URI so that packages published to a third party file server can be accessed via that URI.

Network Drive

Allows you enter network drive information to send stream output to that destination.

- **UNC Path**—The UNC file path on the network drive for the Package generated by this channel.
- **Username**—The username to use to connect to the network drive.
- **Password**—The password to use to connect to the network drive.
- **Publishing Point**—The URI where the Package can be accessed.

Push to CDN

- **Publishing Point**—The URI where the package can be accessed. Publishing Point allows the user to specify a base URI so that packages published to a CDN can be accessed via that URI.

  The HLS Publishing Point has the following form:

  http://post.<host name>/<stream id>

  For example, when Akamai is the CDN, and if your Host Name is MyHostName and your Stream ID is 123456, the HLS Publishing Point is—

  http://post.MyHostName-i.akamaihd.net/123456

  The HLS Playback URL has the following form:

  http://<host name>/hls/live/<stream id>/<channel name>/<channel name>-<variant name>/playlist.m3u8

Note: If you enter the HLS Playback URL in a browser (except Safari) you will only get a listing of all of the HLS .ts segments. If you put the URL into the Bitmovin player, for example, you get the actual HLS stream when you navigate to the Bitmovin HTML page. You can playback the stream in a Safari browser when using the HLS Playback URL. See HLS Stream Playback.

The DASH Publishing Point for Push to CDN has the following form:

http://post.<stream id>.<dash publish entry point>/dash/<stream id>

For example, when Akamai is the CDN, and if your Host Name is MyHostName and your Stream ID is 123456, the DASH Publishing Point is—

http://post.123456.MyHostName.r.akamaientrypoint.net/dash/123456

The DASH Playback URL has the following form:

http://<host name>/dash/live/<stream id>/<channel name>/dashakamai/manifest.mpd

---

Note: When a Publishing Point is entered, and the channel is activated, selecting the Output Preview icon displays a QR code and a preview link. The QR code is valid for HLS and DASH output to the Local Origin Server or a File Server with a Publishing Point, but not for CDN output. See Previewing the Output of the Channel below.

HTTP Method for Push to CDN

Enable HTTP Method to choose either POST or PUT when pushing files to the CDN. When disabled, the default POST method is used, even if PUT shows as selected.

Push to Unified Origin

The Push to Unified Origin output location is only available for DASH Packages.

- **Publishing Point**—The URI where the package can be accessed. Publishing Point allows the user to specify a base URI so that packages published to Unified Origin can be accessed via that URI.

  The Unified Origin Publishing Point has the following form:

  http://<origin name>:<port number>/<channel/input location>/<channel/input location>.isml/

  For example, when pushing to Unified Origin, and if your Origin Name is OriginName, your Port Number is 8080, and your Channel Name is Channel1, the Unified Origin Publishing Point is—

  http://OriginName:8080/Channel1/Channel1.isml/

  The Unified Origin Playback URL has the following form:

  http://<origin name>:<port number>/<channel/input location>/<channel/input location>.isml/.mpd

Secure Publishing to Akamai

When publishing to Akamai 3.2 networks using a secure https URL, a dash "-" is used, instead of a period " . ", between post and the host name.

When using HLS, for example, if your Host Name is MyHostName and your Stream ID is 123456, the HLS Publishing Point is—

https://post-MyHostName-i.akamaihd.net/123456

When using DASH, for example, if your Host Name is MyHostName and your Stream ID is 123456, the DASH Publishing Point is—

https://post-123456.MyHostName.r.akamaientrypoint.net/dash/123456

When publishing to Akamai 4.0 networks using a secure https URL, a period " . ", is used between post and the host name:

https://post.MyHostName-i.akamaihd.net/123456

https://post.123456.MyHostName.r.akamaientrypoint.net/dash/123456

HLS Stream Playback

The Safari browser on Mac is currently the only supported browser for proper playback of HLS streams. This includes all destinations of Local Origin Server, File Server with Publishing Point, Push to CDN, and Push to Unified Origin.

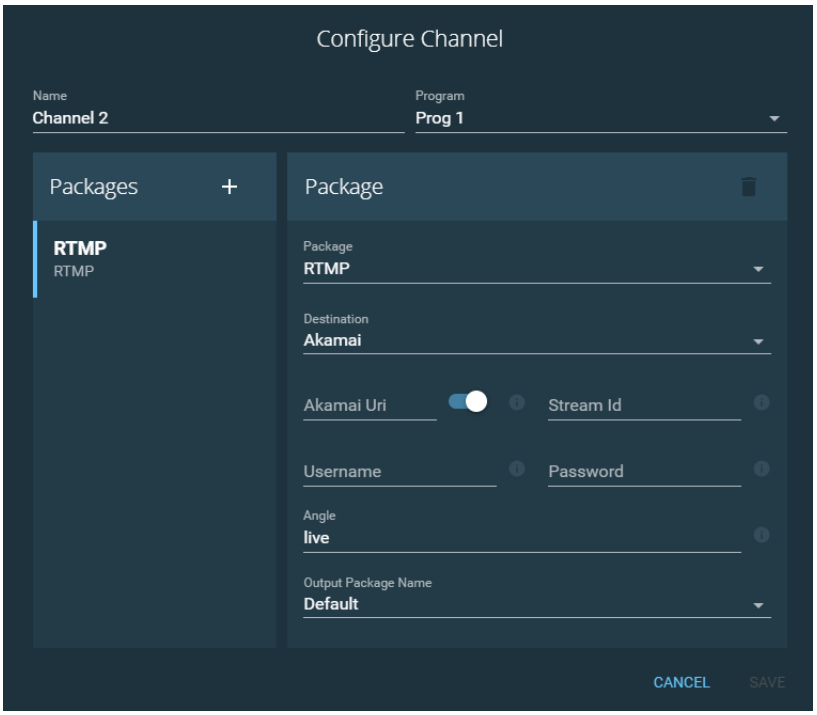
Note: For *encrypted* HLS stream playback using AES encryption, only the latest Mac operating system, Sierra (macOS 10.12), along with the latest version of Safari will properly play the encrypted stream. (Verimatrix encryption does not playback in Safari.)

You can use the Bitmovin player to get proper stream playback when using the HLS Playback URL for CDN publishing.

See Output Location Options for destination path examples.

RTMP Channel Configuration

The RTMP Package can be sent to another Lightspeed Live server, to itself, to Akamai, YouTube Live, or other RTMP destinations such as a Wowza server.



Destinations

- **Custom URL(s)**—Enter a URI publishing point for each Variant.

  The publishing point has the following form:

  rtmp://<server name>:<RTMP port (default is 1935)/live

  For example, rtmp://server.telestream.net:1935/live

Note: You can also push the RTMP stream to another Lightspeed Live server or to itself. When you do, the Stream Name in the Configure/Edit Source dialog must match the Channel Name in the Configure/Edit Channel dialog plus the Variant name. The Stream Name must be <channel name>-<variant name> (there is a dash between the two names). The names are case-sensitive. See Configuring an RTMP Source for the Stream Name.

- **Akamai**—For an Akamai RTMP you must enter the Username and Password, the Akamai URI publishing point (optional), and the Stream Identifier.
- **Angle**—For Akamai output, you can define a value for the angle, which is included in the playback URL. The default is “live”.
- **YouTube Live RTMP**—For RTMP to YouTube, see RTMP Stream to YouTube.

RTMP Playback URLs for Akamai

To playback an RTMP stream from Akamai, use the following URLs:

- **For Video with Audio or Video Only:**

  The playback URL has the following form:

  http://<StreamName>.akamaihd.net/i/<ChannelName>_<Angle>@<StreamID>/master.m3u8

  For example, if your Stream Name is MyStream, your Channel Name is MyChannel, your Variant Name is Variant1, you keep the Angle at the "live" default, and your Stream ID is 123456, the playback URL for video with audio or video only is:

  http://MyStream.akamaihd.net/i/MyChannel_live@123456/master.m3u8

- **For Audio Only:**

  The playback URL has the following form:

  http://<StreamName>.akamaihd.net/i/<ChannelName>_<VariantName>@<StreamID>/master.m3u8

  For example, if your Stream Name is MyStream, your Channel Name is MyChannel, your Variant Name is Variant1, and your Stream ID is 123456, the playback URL for audio only is:

  http://MyStream.akamaihd.net/i/MyChannel_Variant1@123456/master.m3u8

YouTube Live Channel Configuration

Creating a Channel to stream live to YouTube requires specific settings in Encoders and Packages, and creating a connection from Live Stream to your YouTube account by using options in the Configure Channels dialog. See Creating a YouTube Live Stream Channel in the Creating Stream Channels chapter for the complete procedure to create a live stream to YouTube.

Facebook Live Channel Configuration

Streaming to Facebook Live requires specific settings in Lightspeed Live Stream and making a connection from Live Stream to your Facebook account. See Creating a Facebook Live Stream Channel in the Creating Stream Channels chapter for the complete procedure to create a live stream to Facebook.

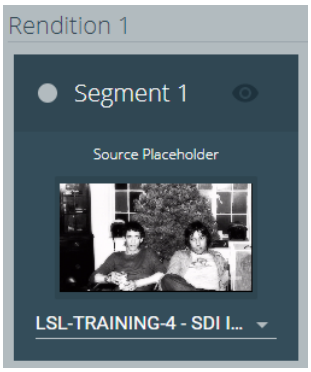
Periscope/Twitter Channel Configuration

For the details on live streaming to Periscope/Twitter, see Creating a Periscope Live Stream Channel in the Creating Stream Channels chapter.

Selecting the Input Source for a Segment

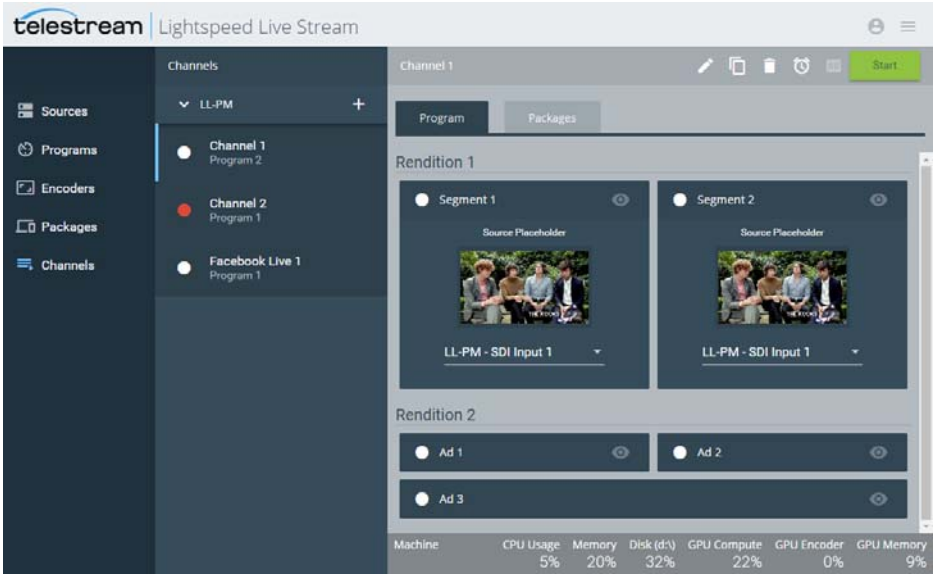
When a Segment has more than one Source asset, you must select the Source to use. From the Input drop-down menu, select the input source to use for each Source Placeholder in the selected Channel. The available selections are what you have configured in the Sources section.

When a Source Placeholder has not been added to the Segment of a Program, the Input section is not populated. When you activate a Channel that does not have an input source, the image or video assets from the Segment are what is provided in the output of the Channel.



Multiple Renditions or Segments

When you select a Package that contains a Program with more than one Rendition, or a Rendition with more than one Segment, the Renditions and Segments all appear as separate items in the Channel view. When you start streaming a Channel, all Renditions and Segments in that Channel are activated. The Segment in the upper left is the primary, or Segment that is active first. Trigger settings and conditions may cause another Segment to become active first, or determine which is active next. The primary Segment is determined by the stacking order in the Programs section. See Stacking Order Determines which Segment is Primary.

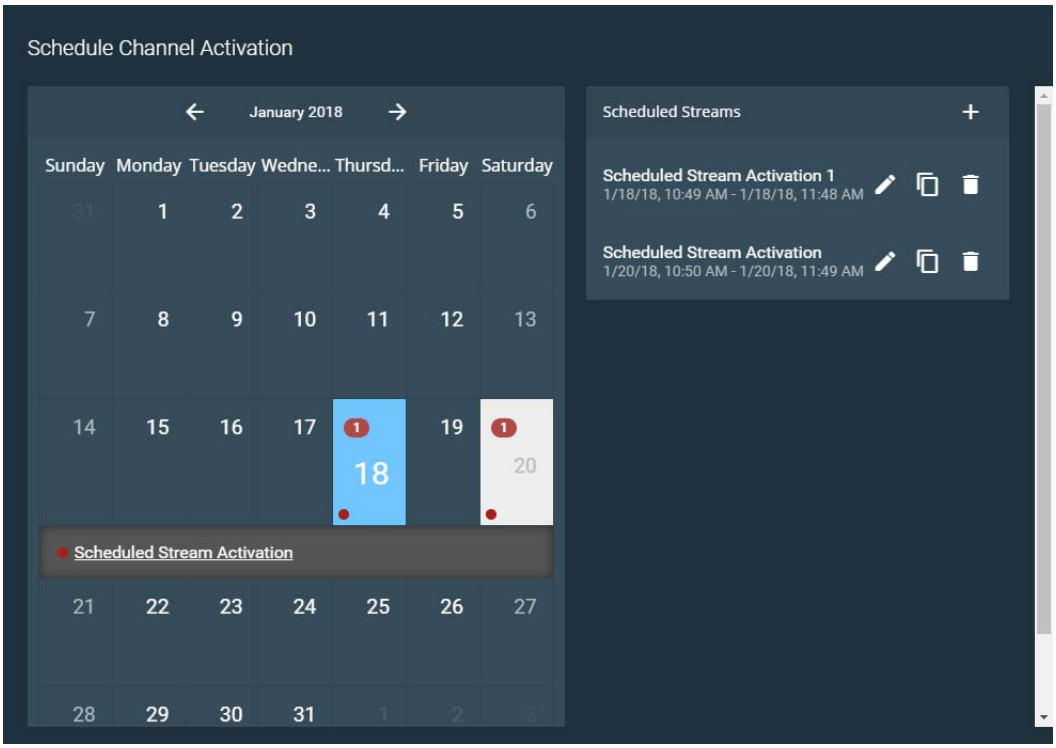


Scheduling Channel Activation Events

The Schedule Channel Activation calendar is used to set schedules for Stream activation and stopping. To open the calendar, first select a Channel and click the clock icon next to the Start button. Click off of the calendar to close it.

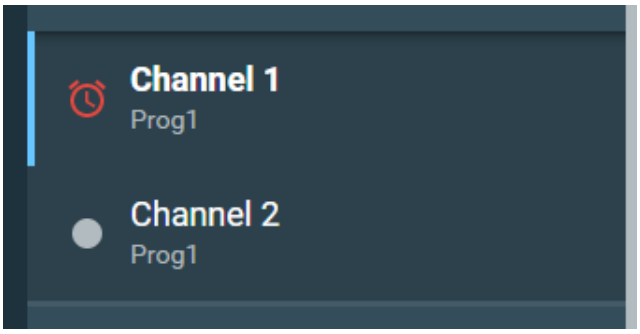
Modify Events when Channel is Active

Existing Calendar Event schedules can be modified even when a Channel is actively streaming. Calendar Events cannot be added or removed when a Channel is active.



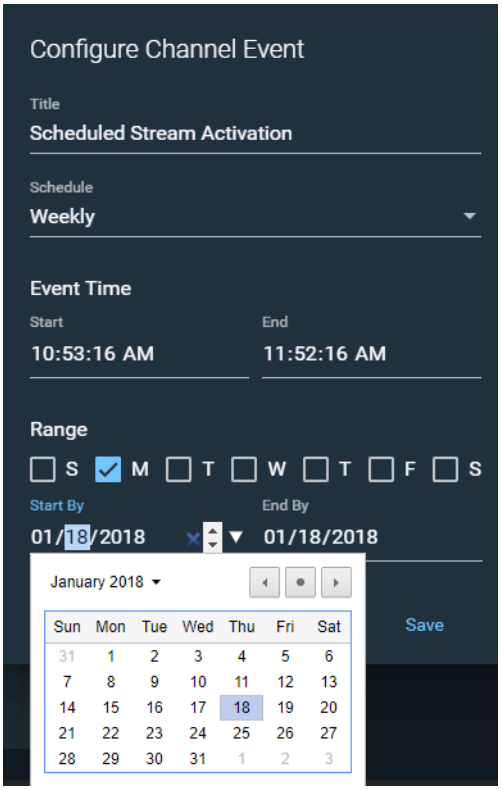
Clock Icon Indicates a Schedule for that Channel

The dot icon next to each Channel changes to a clock icon when a schedule exists on that channel. The clock icon turns red when that Channel is active and is gray when not active.



Configuring Event Schedules

Click the + icon to open the Configure Channel Event dialog so you can set the event schedules.



The Configure Channel Event dialog provides these options:

- **Title**—Enter or edit the title of the stream activation event. You must create a unique name for each event in the Channel.
- **Schedule**—Choose from these schedule options:
  - **Once**—Schedules an event that will occur one time, from the start date and time to the end date and time specified.
  - **Daily**—The event will occur every day, on the days within the date range, and within the start and end times that are set.
  - **Weekly**—Sets the event to occur on selected days of the week, within the specified date range, and within the start and end times that are set.
  - **Monthly**—The event will occur once a month on the date set, on the months within the date range, and occur within the start and end times that are set.
- **Event Time**—Sets the start and end time of the event. To change the time you can type in a value or use the scroll arrows.
- **Range**—Sets the date range for daily and monthly schedules, or the choose days of the week for weekly schedules. To change the date you can type in a value, use the scroll arrows, or select the down-arrow to open a date selection calendar.

Starting and Stopping a Channel

After all settings have been configured, select a Channel and click the large green Start button to activate the Channel. Click the large red Stop button to deactivate the selected channel.

When you start the stream, the selected Source streams to the output format and location you have specified. You can also select other Channels and activate them to stream concurrently.

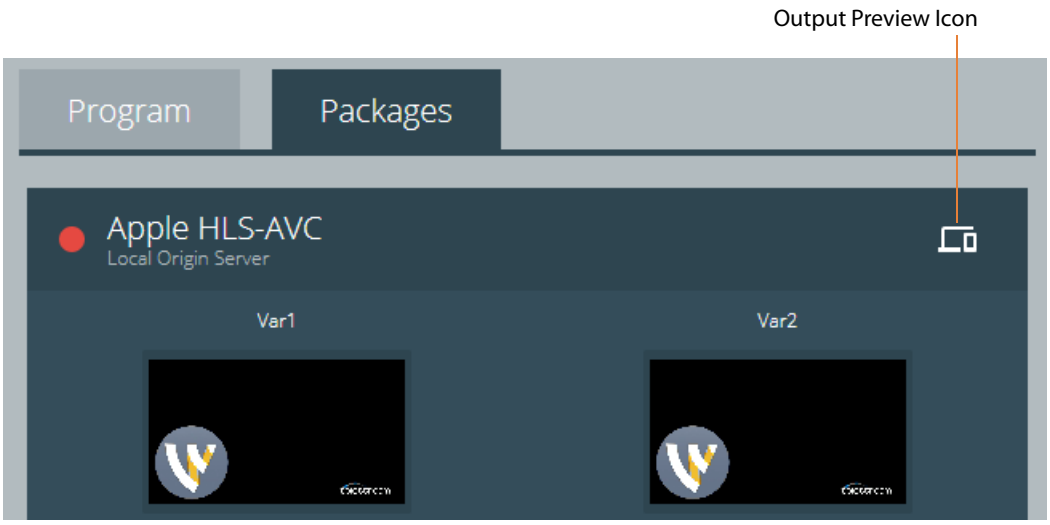
Note: When a stream has been activated by pressing Start, configuration settings cannot be changed for that stream, and a red lock icon appears on the upper right corner of components and settings that are used in the stream. When Stop is pressed, components can again be edited.

While components are locked, some settings can still be duplicated, and existing Calendar Events can be modified.

Previewing the Output of the Channel

When you select the Local Origin Server, or provide a Publishing Point for a File Path, the Output Preview icon becomes active when you start the stream. When the Publishing Point is not configured the Output Preview button is not active. When using the Local Origin Server the Output Preview button is enabled by default.

Select the Packages tab to access the Output Preview icon.



When you click the Output Preview icon a QR code and link appear that you can use to take you to the preview location so you can check to see if the output is active. The QR code is valid for HLS and DASH output to the Local Origin Server or a File Server with a correct Publishing Point, but not for CDN output. You can scan the QR code with a smartphone or tablet, or click the link to access the preview location.

Activated Channel Operation

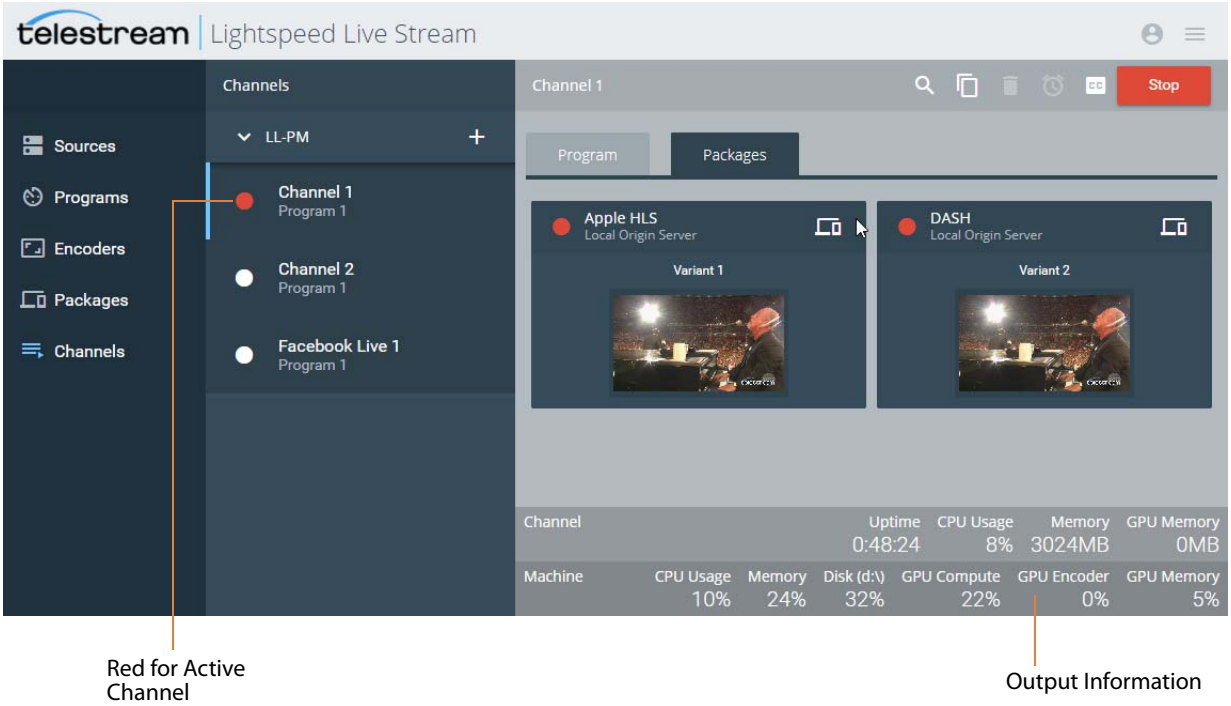
The following image shows an activated Channel. A thumbnail preview of the Stream is displayed on the Packages tab for each Variant. The information bar at the bottom of the window displays the output location and statistics for the resources being used, and the dot or clock next to each Channel turns red when the Channel is active. The dot changes to a clock icon when a calendar schedule exists on that channel.

Output Information

The Output Information bar is divided into two sections:

- **Channel**—The Channel section provides information for the currently selected Channel that is active.
- **Machine**—The Machine section provides the total resource usage statistics for all Lightspeed Live Servers that are currently operating in the system. Select an active Channel to view the Output Information bar.

Note: When the full text of the channel Output Location is too long to be displayed, you can hover over the displayed value to see the full location path in a tooltip.



Creating Stream Channels

This chapter includes workflows for streaming live to YouTube and Facebook, describes live captioning input, provides Lightspeed Live Stream warning and resource usage information, and a listing of the supported input formats.

The following topics are included:

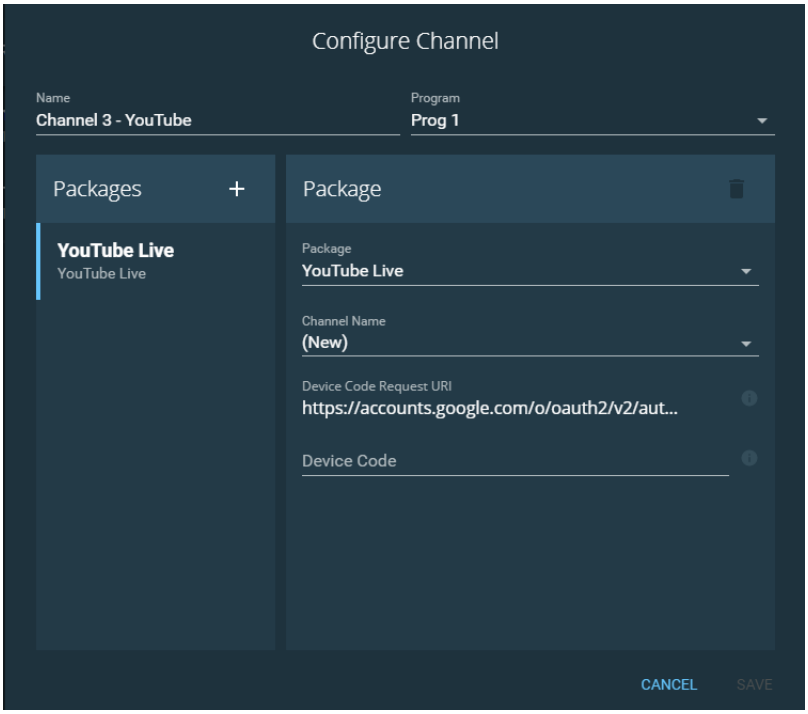
- Creating a YouTube Live Stream Channel
- Creating a Facebook Live Stream Channel
- Creating a Periscope Live Stream Channel
- Using Live Captioning Input via IP
- Live Stream CPU and GPU Resource Usage Guide
- Warnings for Full Queue and Dropping Frames
- Supported Live Stream Source Input Formats

Creating a YouTube Live Stream Channel

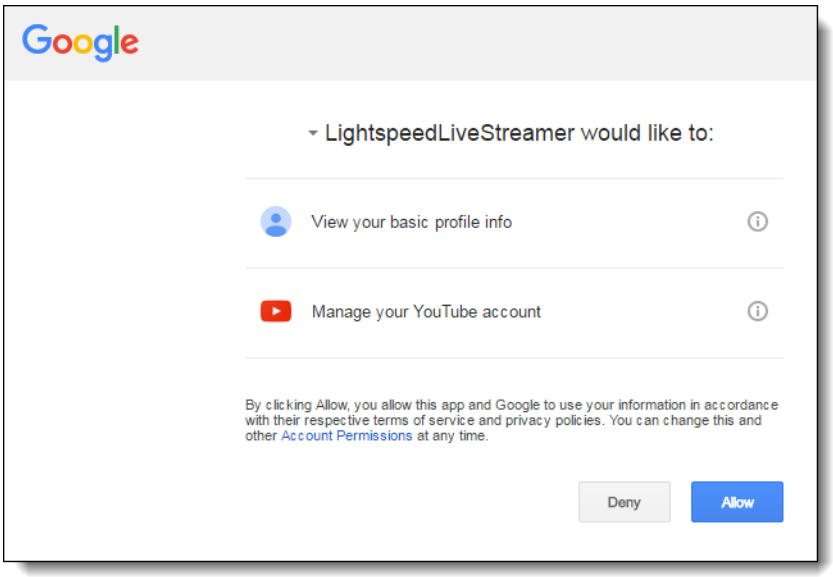
Streaming live to YouTube requires specific settings in Lightspeed Live Stream and making a connection from Live Stream to your YouTube account.

Follow these steps to stream live to YouTube using the YouTube Live Package method:

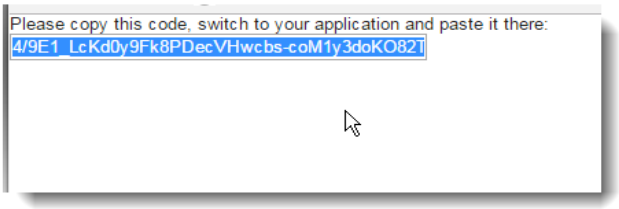
1. Create the Program you want to use to stream live to YouTube. See Configuring Programs.
2. Create the audio and video Encoders you want to use to stream live to YouTube. See Configuring Encoders. Only certain encoder settings are allowed, see YouTube Live Encoder Settings.
3. In Packages, Click the + menu to create a new Package and select *YouTube Live*. Enter the name for the Package and select the Program you want to use. See Configuring Packages.
4. Add a Variant to the Package; selecting the Rendition, Video Stream, and Audio Stream encoders that you created for YouTube. Only one Variant is allowed for a YouTube Package.
5. Now go to YouTube in a different browser tab and Log into the YouTube account you wish to stream to. This can be an existing YouTube account or you can create a new one.
6. Back in Live Stream Channels, Click the + menu to add a new Channel. The Configure Channel dialog opens.
7. Type a name for the Live Stream Channel, select a Program, add a Package, then select the Package you created for YouTube.



8. For Channel Name select (New).
9. Click on the Device Code Request URI link. A new tab or window opens in your browser (depending on your browser settings) for you to verify permissions from Live Stream to your account.



10. Click Allow. A new page opens that contains the Device Code.

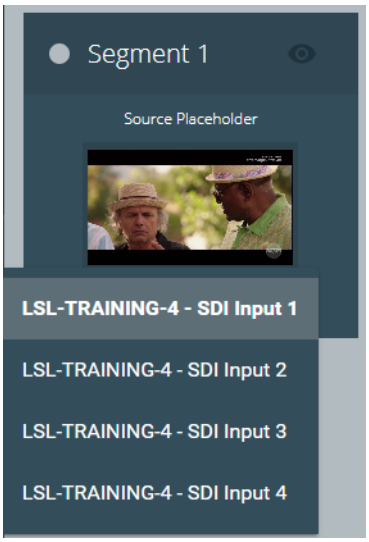


11. Click on the Device Code to select it, then copy the code and go back to Live Stream and paste the code into the Device Code field.
12. Click Save to accept the settings. This creates the Channel and connects to your YouTube account.

Note: Once you have established the connection to a YouTube account, that account is available under Channel Name in the Configure Channel dialog when you create a new Channel. The Device Code connection procedure does not need to be repeated for that YouTube account.

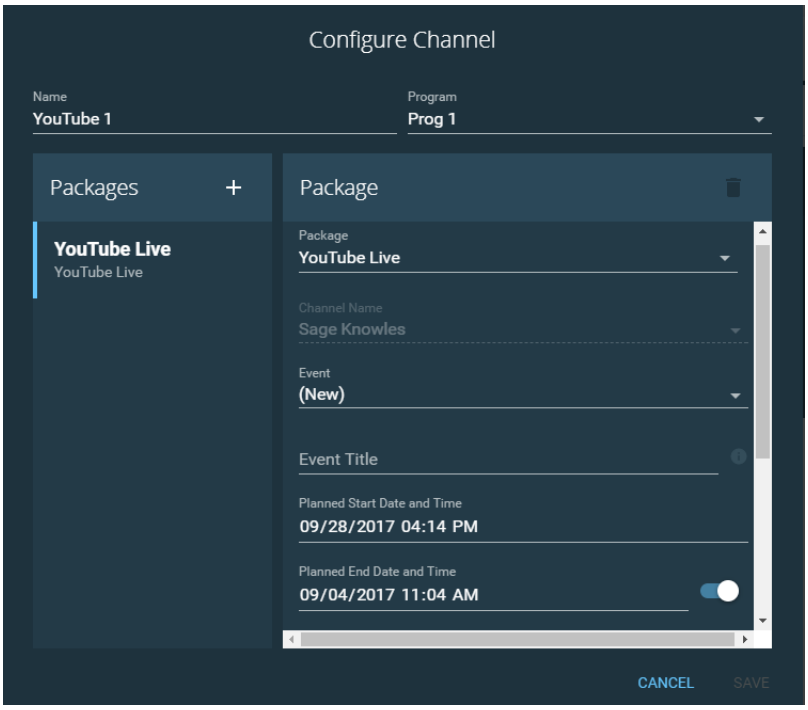
---

13. Select the new Channel you just created, click the Program tab and choose an Input Source for the Segment(s).



14. Select the new Channel and click the Pencil icon to open the Configure Channel dialog.
15. From the Event menu you can select (Default Channel) or (New). When you select (New) the following options become available:
    - **Event Title**—Enter the name for the event.
    - **Planned Start Date and Time**—Set the planned start date and time, for notification of your subscribers. (This does not start the live Stream. Press the Start button to start the live stream. See step 17 below.)
    - **Planned End Date and Time**—Set the planned end date and time. This is only for subscriber notification and does not stop the live stream.
    - **Broadcast Description**—Create an optional description.
    - **Tags**—Enter any search or description tags you would like for the live stream.
    - **Privacy**—Select the privacy setting you want for the live stream.
    - **Closed Captions**—Turn on Closed Captions if they are included in the live stream. When enabled, the captions from the source are included. If you want to select from C608 or C708 caption text tracks in your input source, see Adding Text Tracks for 608 and 708 Captions. Options for adding captions are also available in YouTube.
    - **Category**—Select the YouTube category associated with the live stream.

– **Delete Video from YouTube After Broadcast**—Turn this on to have the video deleted so it cannot be watched at a later time.

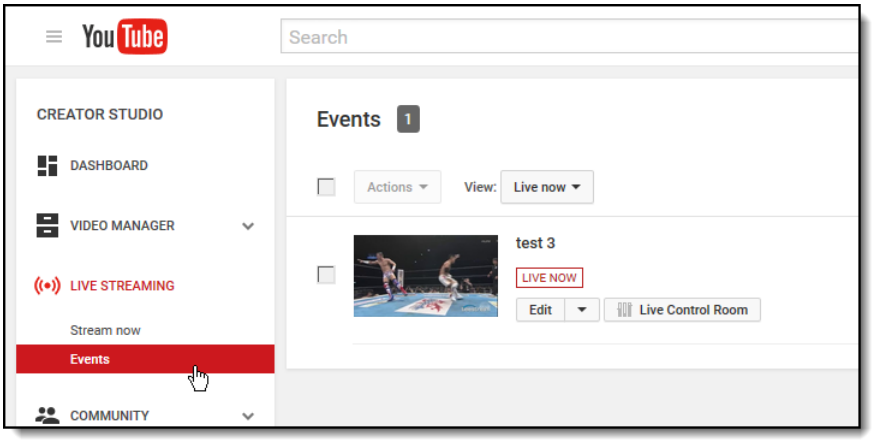


16. Click Save. The Channel is now ready to stream live.

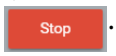
17. Select the Channel you just saved and click the Start button

.

18. Go to your YouTube channel and from the menu on the left select Live Streaming > Events.



19. On the YouTube page you can select the thumbnail to view the live stream, or select Edit or Live Control Room to manage the live stream.

20. After the program has concluded, click the Stop button in Live Stream to deactivate the channel 

.

Sending Multiple Streams to YouTube from One Channel

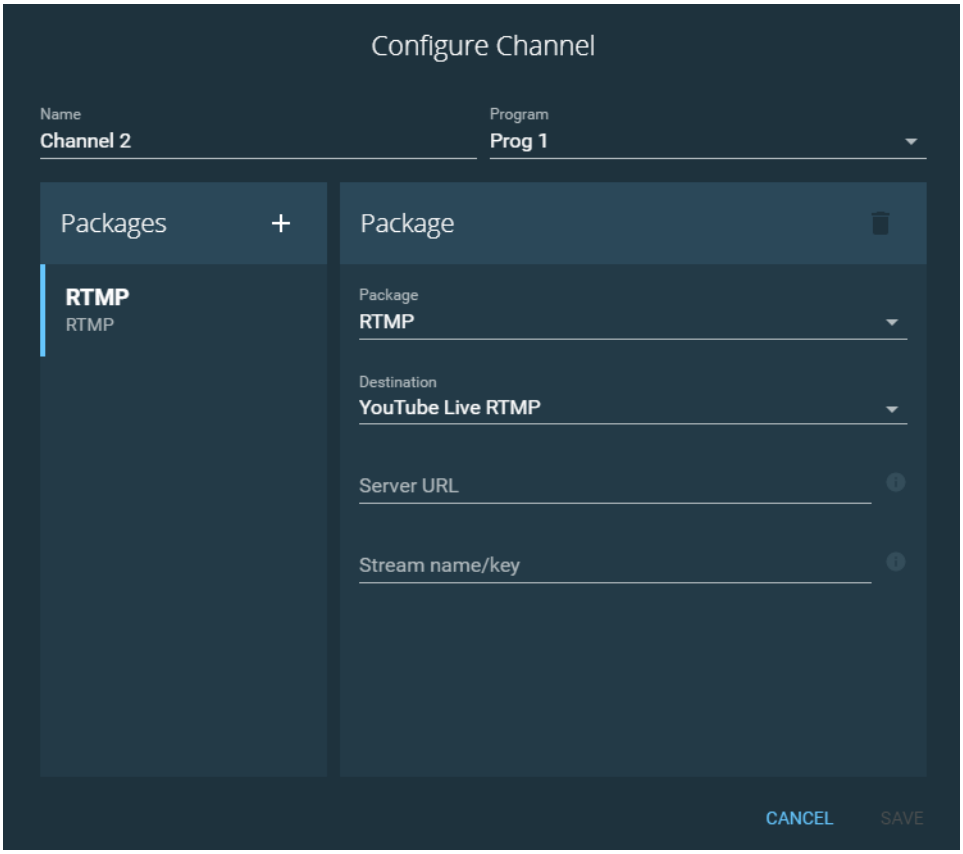
You can create up to six Secondary Packages in the Configure Channel dialog to send multiple version of the video stream to different YouTube accounts or brand channels.

The options for Secondary Packages are the same as Primary Packages.

Note: You cannot send a live stream to Facebook and YouTube in the same Channel.

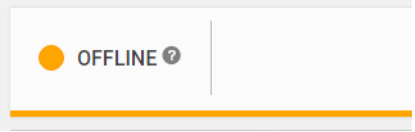
RTMP Stream to YouTube

The RTMP method of streaming live to YouTube allows you to enter the Server URL and Stream name/key from the YouTube Live dashboard. There are not as many options available with this method as there are with the YouTube Live Package method described above.



- **Server URL**—Enter the Server URL from the YouTube Live dashboard.
- **Stream name/key**—Enter the Stream name/key from the YouTube Live dashboard.

Note: If you mistakenly stream multiple active RTMP streams to the same YouTube account, YouTube will show a unique Offline status. Additionally, it will look like your RTMP stream is not connecting to YouTube. The status will be Offline, but with an orange stream strength indication color.



If you ever encounter this YouTube status, there is a good chance that you have more than one active RTMP stream pointed to that YouTube account.

Creating a Facebook Live Stream Channel

Streaming to Facebook Live requires specific settings in Lightspeed Live Stream, changing the Facebook app privacy settings, and making a connection from Live Stream to your Facebook account. Please refer to Facebook Live help for their current maximum time limit for the live stream.

Changing Facebook App Privacy Settings

The default privacy settings for your user is Only Me for apps in Facebook and must be changed for the Live Stream video to display for friends or to public viewers. The privacy settings for Pages, Groups, and Events is already set by Facebook to Public, and can't be changed.

To change your user app privacy settings in Facebook:

1. Log into your Facebook user account.
2. Click the down-triangle in the top right of Facebook and select Settings.
3. Click Apps in the left menu.
4. Hover over the Live Stream app and click the pencil icon to edit its settings.
5. Change App Visibility to Public or Friends.

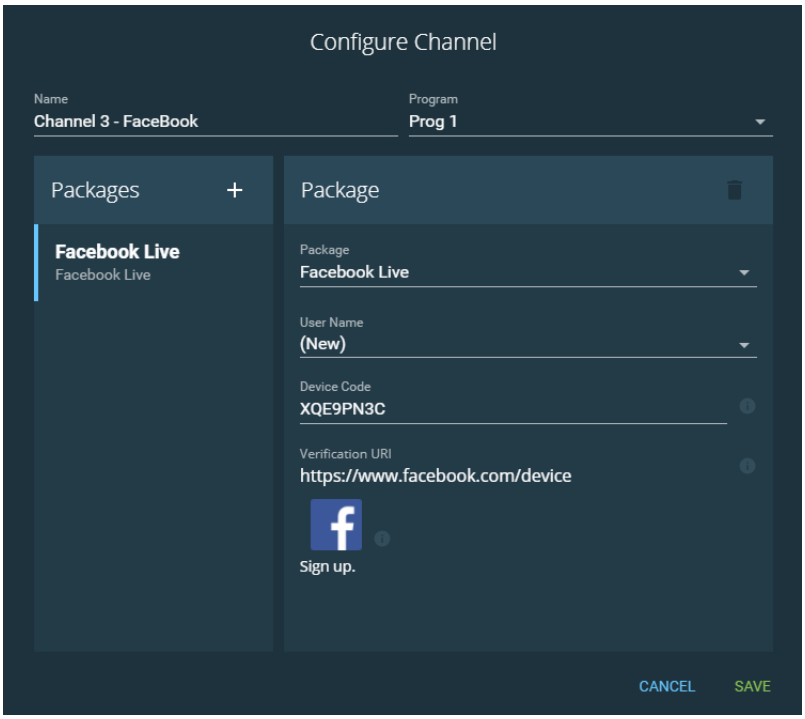
Note: If you set your Live Stream app privacy settings in Facebook to Friends, then Live Stream can use the Only Me or Friends privacy values but not Public, even if you select Public in Live Stream. If you set your Live Stream app privacy settings in Facebook to Public, then you can select from all options in Live Stream: Only Me, Friends, or Public.

Configuring the Live Stream to Facebook

Follow these steps to stream live to Facebook using the Facebook Live Package method:

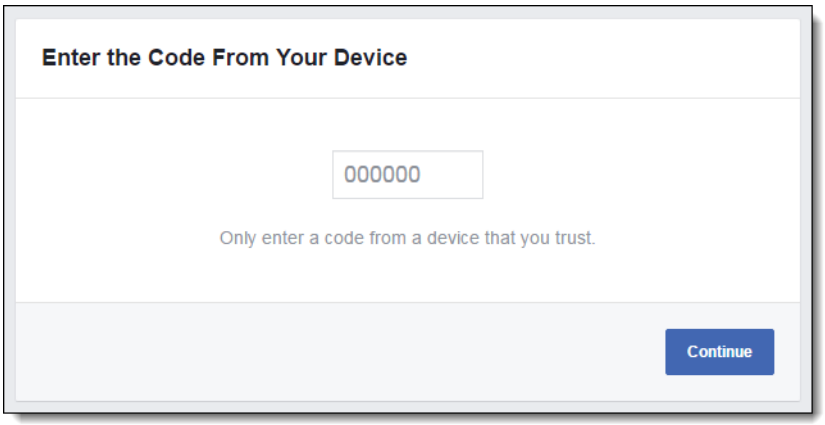
1. Create the Program you want to use to stream live to Facebook. See Configuring Programs.
2. Create the audio and video Encoders you want to use to stream live to Facebook Live. See Configuring Encoders. Only certain encoder settings are allowed, see Facebook Live Encoder Settings.
3. In Packages, Click the **+** menu to create a new Package and select *Facebook Live*. Enter the name for the Package and select the Program you want to use. See Configuring Packages.
4. Add a Variant to the Package; selecting the Rendition, Video Stream, and Audio Stream encoders that you created for Facebook Live.

5. Now go to Facebook in a different browser tab and Log into the Facebook account you wish to stream to. This can be an existing Facebook account or you can create a new one.
6. Back in Live Stream Channels, Click the **+** menu to add a new Channel. The Configure Channel dialog opens.



7. Type a name for the Channel, select a Program, add a Package, then select the Package you created for Facebook Live.
8. The first time you connect, for User Name select (New). After you connect once, your user name is inserted and available to create channels in the future.
9. Double-click on the Device Code to select it and use Control+C to copy to your clipboard for use in the next step.

10. Click the Verification URI link. A new tab or window opens in your browser (depending on your browser settings) for you to enter the Device Code into the Facebook account.



11. Click in the field provided and Press Control+V to paste the Device Code.
12. Click Continue. A confirmation screen indicates that the connection is a success.
13. Go back to Live Stream and click Save in the Configure Channel dialog. (If you do not click Save soon enough [about 2 minutes] the connection is deleted and you will need to establish the connection again.)
14. Select the Channel you just saved and click the Pencil icon to open it for editing.
15. For Schedule, select one of these connection methods:
    - **Go Live Now**—When you start the Channel the stream goes live immediately.
    - **Schedule for Later**—The video starts later at the time and date you set. A message is posted on the viewing location and a message may be sent to

potential viewers, depending notification settings, stating the planned start date and time.

After you start the channel stream, the following status messages are added to the Schedule name and will update when the status changes:

- **[Unpublished]**—The video is live but you have hidden it on your Timeline so it can't been seen. See Hiding or Deleting a Video on Your Facebook Timeline.
- **[Scheduled_Unpublished]**—The scheduled event has been created but has not started.
- **[Scheduled_Live]**—The event is live but video is not yet appearing.
- **[Scheduled_Expired]**—The live video was not started within 10 minutes of your planned start time.
- **[Scheduled_Canceled]**—The scheduled event has been canceled.
- **[Live]**—Indicates the channel is currently streaming live.
- **[Live_Stopped]**—The live stream has been stopped.
- **[Processing]**—After you stop the channel, indicates that processing is occurring.
- **[VOD]**—(Video On Demand) Indicates that the video is available to view on Facebook after the live stream event has ended.

16. The following options are available, depending on your Schedule selection:

- **Planned Start Date and Time**—Set the start date and time (Available when Schedule for Later is selected). The planned start time you set must be at least 10 minutes, or more, in the future from the current time. If less than 10 minutes, the live stream is canceled and the channel will need to be reconfigured to make a new connection. The planned start time cannot be greater than 24 hours in the future.
- **Event Title**—Enter the name for the event.
- **Broadcast Description**—Create an optional description. It's a good idea to have a description because this is displayed with the video.
- **Secure Connection (SSL)**—Enable to use secure connection, utilizing RTMPS.
- **Delete after Broadcast**—Enable this to have the video deleted from Facebook so it cannot be watched at a later time.
- **Post To**—Select one of these options for the video stream destination:

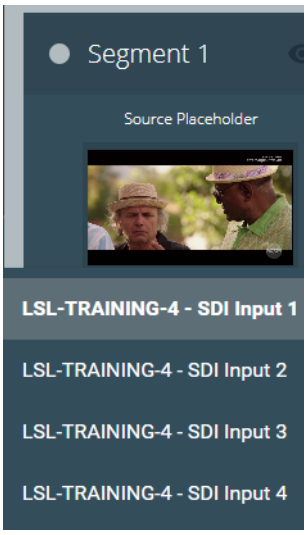
  User—Your user Timeline.

  Pages—Pages you have created and own in Facebook. When you select this option your Pages become available to select.

  Groups—Groups you have created and own in Facebook. When you select this option your Groups become available to select.

  Events—Events you are an admin for. When you select this option your Events become available to select.

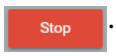
17. When User is selected, the following Privacy options are available:
    - **Public**
    - **Friends**
    - **Only Me**
18. Click Save to close and save the Configure Channel dialog changes.
19. Select the new Channel you just created, click the Program tab and choose an Input Source for the Segment(s).



20. Select the Channel and click the Start button . Live Stream connects to Facebook and starts the video stream immediately, or later, depending on your schedule selections.
21. Go to the destination on Facebook and view your live streaming video.

Note: You may need to refresh the page to see the live video, and refresh again later after you've stopped the live stream to see the saved playable video in your Timeline.

---

22. After the program has concluded, click the Stop button in Live Stream to deactivate the channel  .

Using the Same Channel to Stream Again to Facebook

You can stream again to Facebook using the same channel. To reactivate the channel, select *Go Live Now* or *Schedule For Later* from the Schedule menu and set the schedule. You can change the name and description if desired. The *Post To* settings cannot be changed when reusing a channel to stream.

Sending Multiple Streams to Facebook from One Channel

You can create up to six Secondary Packages in the Configure Channel dialog to send multiple version of the video stream to different Facebook destinations, such as your Pages, Groups, or Events.

The options for Secondary Packages are the same as Primary Packages.

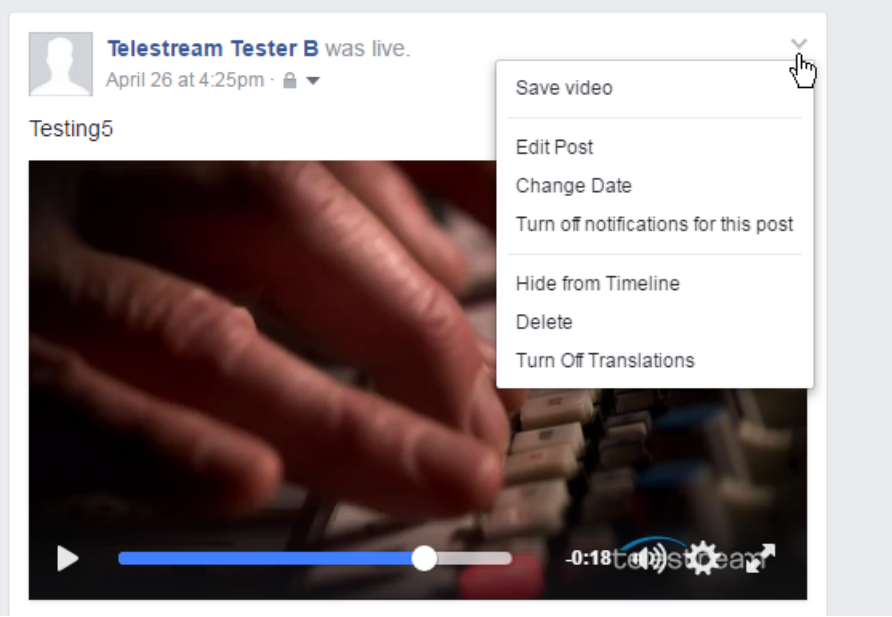
Note: You cannot send a live stream to YouTube and Facebook in the same Channel.

Hiding or Deleting a Video on Your Facebook Timeline

You can select various options for videos on your Facebook Timeline, such as hiding or deleting them. These options can apply to both live streaming and saved videos.

To select options in Facebook for your videos:

1. Open the menu in the upper right corner of the posting on your Facebook Timeline.



2. Select the option you want, such as Hide from Timeline, Delete, or Edit Post.
3. Confirm the operation in the dialog that appears.

Revealing a Hidden Video

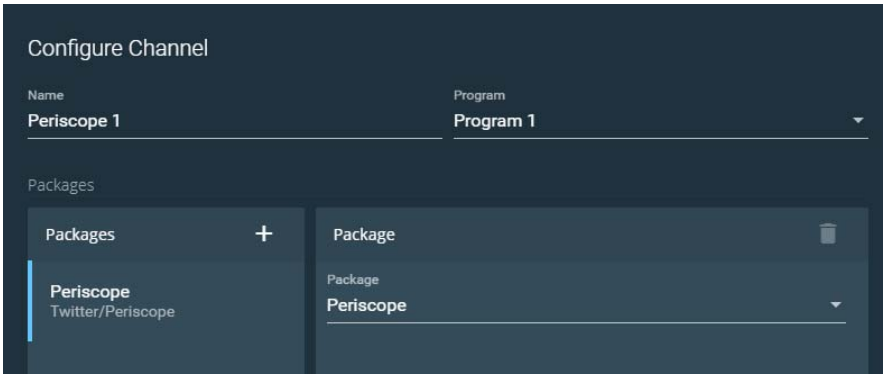
When you have hidden a video and want it to be visible again, select the Undo link that is in the location on your Timeline where the video was displayed:

Creating a Periscope Live Stream Channel

Streaming live to Periscope/Twitter requires specific settings in Lightspeed Live Stream and making a connection from Live Stream to your Periscope/Twitter account.

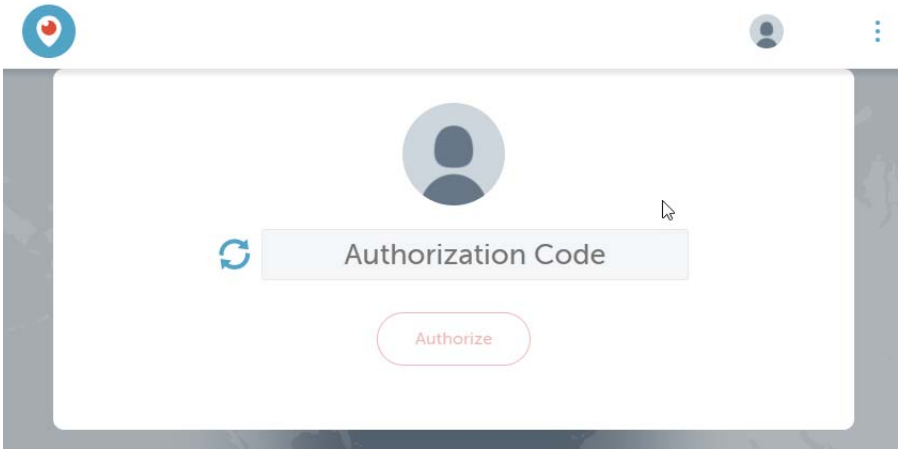
Follow these steps to stream live to Periscope:

1. Create the Program you want to use to stream live to Periscope. See Configuring Programs.
2. Create the audio and video Encoders you want to use to stream live to Periscope. Settings recommended by Periscope are provided as an AVC encoder preset, named "Periscope_AVC_960x540_30fps". See Periscope Encoder Settings.
3. In Packages, Click the **+** menu to create a new Package and select *Periscope*. Enter the name for the Package and select the Program you want to use. See Configuring Packages.
4. Add a Variant to the Package; selecting the Rendition, Video Stream, and Audio Stream encoders that you created for Periscope.
5. In Channels, Click the **+** menu to add a new Channel. The Configure Channel dialog opens.
6. Type a name for the Channel, select a Program, then add a Package, selecting the Package you created for Periscope.

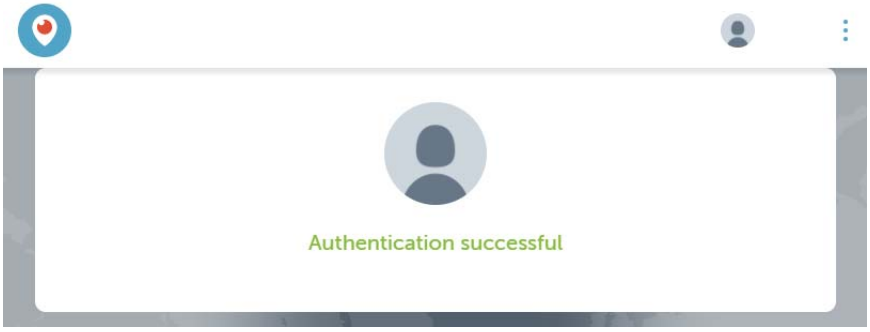


7. For Channel Name select (New), or select your User Name if you have previously connected to the account you want to use. A User Code is generated and a URI is provided to connect to Periscope.
8. Select the User Code and copy it to place it on your clipboard.
9. Click on the Verification URI link. A new tab or window opens in your browser (depending on your browser settings) for you to verify permissions from Live

Stream to your account, or to paste the User Code into the Authorization Code field if you are already logged in.



10. Click Authorize. An Authentication Successful message appears when the connection succeeds.



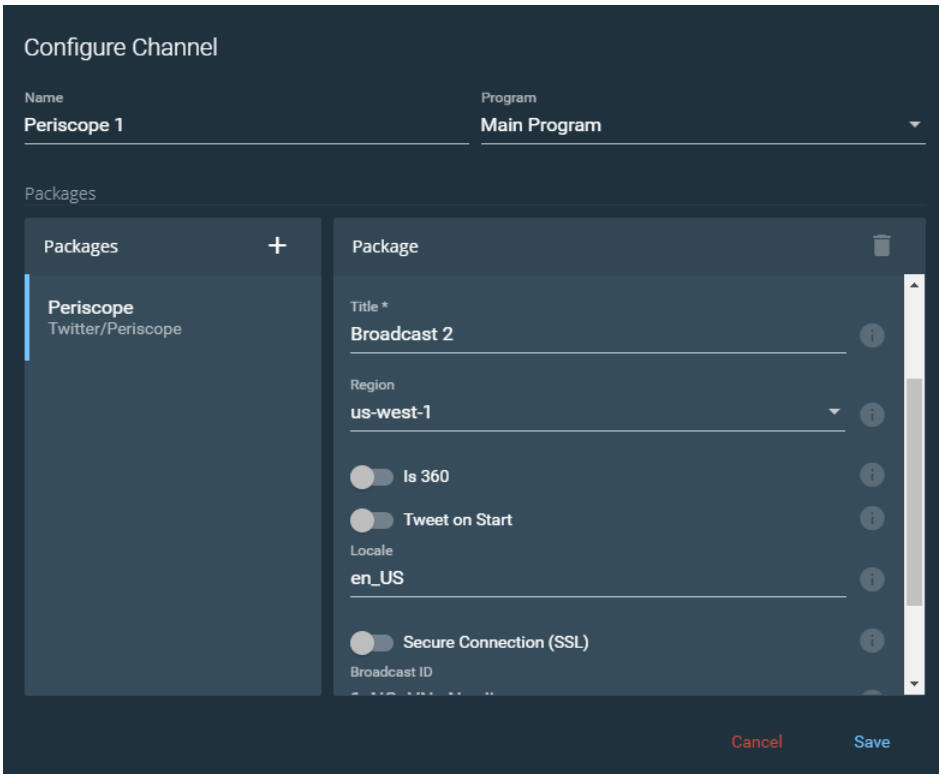
Note: Once you have established the connection to a Periscope account, that account is typically available under User Name in the Configure Channel dialog when you create a new Channel. The User Code connection procedure does not need to be repeated for that Periscope account.

---

11. Go back to Live Stream and click Save to close the Configure Channel dialog. This allows your user settings from Periscope to populate the dialog.

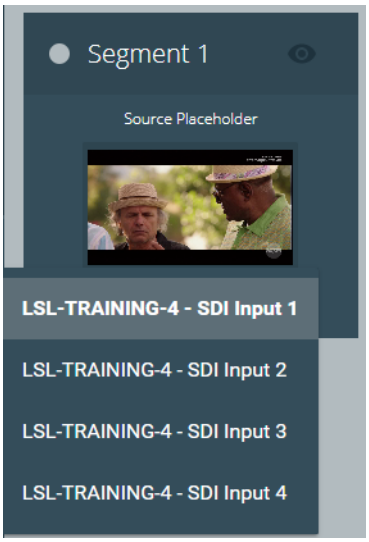
12. Select the Periscope Channel you just saved and click the Pencil icon to open it for editing. It is now populated with the Periscope information and options.

13. Select your User Name (if not already selected) in the Configure Channel dialog. The following options become available:
    - **Title**—Enter the title of the broadcast.
    - **Region**—Select the region you want to use.
    - **Is 360**—Enable if the broadcast should be interpreted as a 360 source.
    - **Tweet on Start**—Enable if you want a Tweet sent upon the start of the broadcast.
    - **Locale**—Locale of the user, which is used for broadcast classification and discovery. For example, en_US is for the English language in the United States.
    - **Secure Connection (SSL)**—Enable when you want to use a secure connection over SSL.
    - **Broadcast ID**—This is the broadcast ID provided by Periscope and will be filled in automatically when you click Save.
    - **Share URL**—This is the URL provided by Periscope for watching this broadcast and will be filled in automatically when you click Save.



14. Click Save to accept the settings. This creates the Channel and connects to your Periscope account. (The Share URL is created after you save the settings and close the dialog.)

15. Select the new Channel you just created, click the Program tab and choose an Input Source for the Segment(s).



16. To copy the Share URL, select the Channel you just created and click the Pencil icon to open the Configure Channel dialog. Select the Share URL and copy it to your clipboard.

17. Click Save. The Channel is now ready to stream live.

18. Select the Channel you just saved and click the Start button Start.

19. If you copied the Share URL, open a new browser tab and paste the Share URL in the address field and press Enter. The broadcast should appear and the URL can be given to others to view the broadcast. (The listing of broadcasts will also appear in your Twitter Profile.)

20. When the program has concluded, click the Stop button in Live Stream to deactivate the channel Stop.

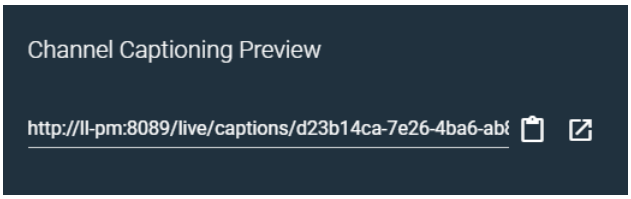
Using Live Captioning Input via IP

Lightspeed Live Stream supports a 1200 baud TCP live captioning stenographer input over IP (IPv4), with parameters similar to what works with typical caption encoders, such as the Evertz HD9084.

Accessing the Captioning Preview

A preview is available of an active Channel, which a stenographer can view to create the live caption input. This preview is synchronized to the source input timing, and occurs before the any time delay set in the Channel Delay option.

To access the preview of an active Channel, click the Closed Captioning icon in the upper right to access a URL to view a preview of the stream for that Channel. In the dialog that opens, click the clipboard icon to copy the URL or click the arrow icon to open the link in a new browser window.



Channel Time Delay and IP Port Settings

The Channel Delay option, which is available in the Channel Configuration dialog, applies a delay, in seconds, to the program output before encoding. This delay occurs *after* the Captioning Preview in order to provide the time needed to create and add the captions to the input feed.

The IP Port used for the captioning input is set in the Channel Configuration dialog. The Port setting must be enabled to activate the live captioning input feature.

See Channel Configuration for the location to set the Captioning IP Port number and the seconds of Channel Delay.

Frame Rates for Live Captioning

The following frame rates are supported for the live captioning input and the output that contains the captions:

- 23.976, 24, 29.970, 30, 59.94, and 60 fps

The frame rates of 25 and 50 fps are not supported.

Using CaptionMaker for Live Caption Input

The Telestream CaptionMaker application can be used as a source for live caption input into Lightspeed Live Stream. For detailed instructions, see the "*Sending Live Captions to a Telestream Lightspeed Live Stream Server*" topic in the *CaptionMaker User Guide*.

Live Stream CPU and GPU Resource Usage Guide

A Lightspeed Live server contains dual multi-core CPUs, a single GPU, and 64GB (or more) of RAM that are used to ingest, process, encode, and stream multiple channels of live real-time content. Each channel can contain multiple encoded variants with up to 16 channels of audio.

Note: When Live Capture and Live Stream are being used on the same Lightspeed Live server, see the *"Lightspeed Live Capture Resource Calculator"* topic in the *Lightspeed Live Capture User Guide*, along with the Live Stream Resource Usage Guide described here to determine how Capture and Stream can best share a Lightspeed Live server's resources.

Care must be taken not to exceed the limits of the Lightspeed Live server's available resources. The factors that consume the Lightspeed Live server's resources are described in the following topics.

Video Encoders

The following video compressor and processor options are available in the Lightspeed Live Stream encoders.

Video Compressor

There are two video compression types that you can select, AVC (Advanced Video Coding) and HEVC (High Efficiency Video Coding).

AVC

- **x264**—H.264 encoding using an x264 compression library. This compressor uses CPU resources only.
- **Lightspeed GPU**—H.264 encoding using the on-board GPU to accelerate the compression process. This compressor primarily uses GPU resources and very little CPU resources.

HEVC

- **x265**—HEVC/H. 265 encoding using CPU resources only.
- **Lightspeed GPU**—GPU accelerated H.265 encoding using less CPU.
- **Lightspeed HW**—HEVC hardware compression. Uses only the (optional) HEVC video card hardware resources.

Video Processor

You can choose to have the processing of the incoming video signal performed by the default CPU libraries, or the GPU to accelerate the processing.

- **Default**—All video processing is performed on the CPU. The Default video processor creates high quality video and consumes only CPU resources.
- **Lightspeed**—Video processing is accelerated on the GPU, using very little CPU resources. In general, the Lightspeed video processor creates a high quality picture at the expense of using a greater amount of GPU resources.

Image Overlay

You can apply a Video Asset or Image Asset (see Adding Materials section in Configuring Programs) as an overlay onto your main video image. Overlays can consume considerable GPU and/or CPU resources. Use caution when applying overlays, and restrict the *total combined* image area for overlays applied within active Channels to 1920x1080.

How Settings Affect Resources

Here are some signal processing parameters to keep in mind that affect overall resources:

- **Encoded Frame Size**—The larger the frame size the more resources are consumed.
- **Encoded Frame Rate**—The higher the frame rate the more resources are consumed.
- **Encoded Bit Rate**—The higher the bit rate the more resources are consumed.

Create Package Variants that have Efficient Resource Usage

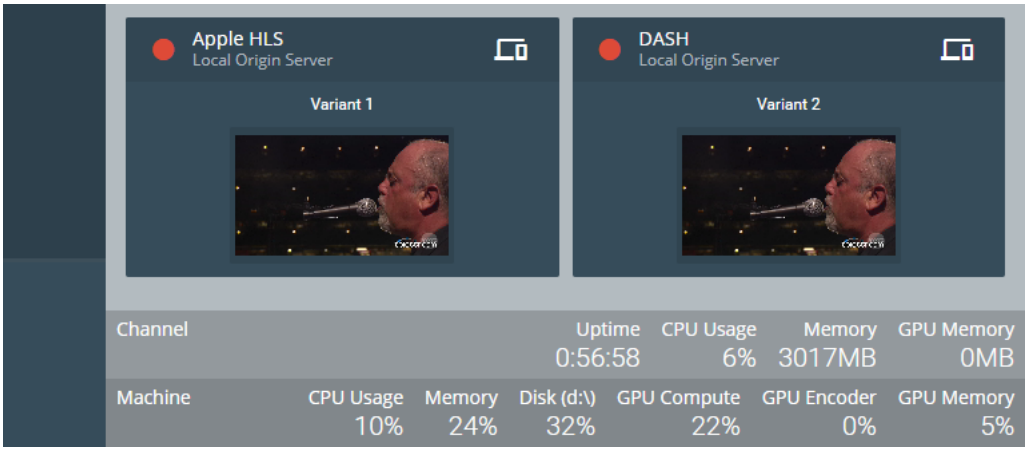
Every channel has one or more Variants, which are created in the Packages section. For each Variant you choose a Video Stream, which contains the video compressor and video processing you selected in the Encoder section for that Stream.

In order to maximize quality, while minimizing resources, you can create a combination of Variants using compressors and video processor selections that result in your required outputs while limiting the total resources used.

The recommended *maximum* resources that should be consumed for all active Channels and Machines is:

- 70% for CPU Usage while streaming.
- 85% for GPU Usage while streaming.

The percent of CPU Usage and GPU Usage is provided in the Output Information display which appears when Channels are actively streaming. The Channel section provides information for the currently selected Channel that is active. The Machine section provides usage information for all Lightspeed Live Servers currently operating in the system.

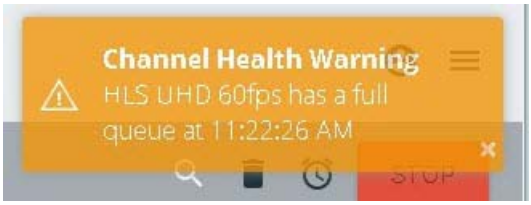


Warnings for Full Queue and Dropping Frames

When a Channel in Live Stream is actively producing output, a warning message is displayed when full queue or dropped frame conditions reach certain parameters. The message provides some information about the source of the error and a time-stamp of when the error occurred. The message will continue to be displayed until closed by the user. A warning icon is also displayed in the Channels section on the Package thumbnail and Packages tab of the Channel that triggered the warning.

Full Queue Messages

A “full queue” warning is displayed when any queue in the internal processing chain reaches the 100% full state. A 100% full queue holds 10 seconds of samples (frames), so for a 30 fps stream a queue will hold 300 samples.



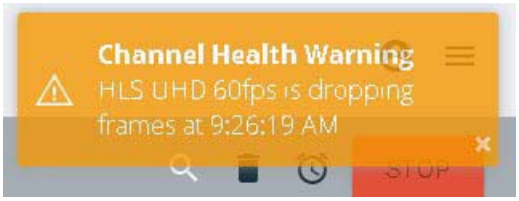
If a component is able to catch up and reduce it's input queue below 50% (5 seconds), another message reading "input queue < 50%" is displayed, which indicates a return to normal operation.

Once the queue is marked "full", no additional messages are displayed for that queue until it falls below 50%. So if it drops to 80% and then goes back up to 100%, that does not trigger another "full queue" message.

The full queue behavior can also be affected by a shortage of CPU and GPU resources, which typically occurs when several channels are being run with multiple variants. Any "full queue" messages could be interpreted as a suggestion to stop one of the channels and allow the remaining queues to recover. Subsequent messages about "input queues < 50%" are an indication of recovery.

Dropping Frames Messages

Frames are dropped if the compressor falls behind real-time processing. The “dropping frames” warning appears when the video compressor can't compress the frames fast enough to keep its input queue from filling up. The frames are dropped from the streaming output, but the duration of subsequent frames is extended to compensate for the dropped frame(s), so the audio and video will stay in sync on the output.



The "dropping frames" message is displayed when the compressor queue reaches more than 10% full. Subsequent messages stating that the stream is "no longer dropping frames" indicates a return to normal operation.

Supported Live Stream Source Input Formats

The following formats are supported in Lightspeed Live Stream for live input via SDI or IP sources:

SDI

- 4 HD inputs, up to 1080p and 50/60fps
  or 1 UHD/4k input, up to 2160p and 50/60fps
- AES Embedded Audio, up to 16 channels

IP

- MPEG-2 Transport Stream (SPTS, MPTS)
- MPEG-2 and AVC (H.264) Video
- SMPTE 302M, MPEG Layer2, AAC, AC-3, EAC3 Audio
- RTMP TCP protocol support for source input, including support for Wirecast RTMP input

Content File Sources

The following formats are supported for file sources:

- **Stills or Slate**—TIFF, PNG, JPEG, GIF, Animated GIF, and BMP
- **Logos with Alpha**—TIFF, PNG, GIF, and BMP
- **Animations with Alpha**—ProRes and Animation Lossless MOV
- **Local Movie Clips**—ProRes/MOV, MP4, MPEG-2, and MXF
- **Audio**—AIFF, WAV, MP3
- **Playlists**—SMIL (.smil)

Appendix: Support

This appendix provides contact resources for Telestream Support services, troubleshooting information, and RMA procedures.

These topics are included:

- Obtaining Support | Information | Assistance
- Locating the Live Stream Service Tag
- Log Files for Live Stream
- Return Material Authorization (RMA) Procedure

Obtaining Support | Information | Assistance

Contact Telestream as indicated below.

Telestream Contact Information

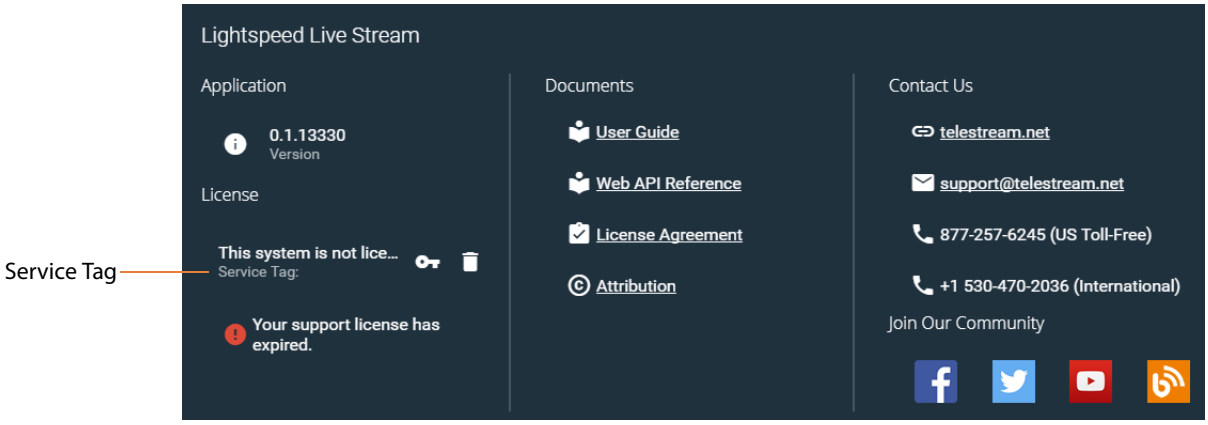
Resource	Contact Information
Lightspeed Live Support	Website: www.telestream.net/telestream-support/lightspeed-live/support.htm Support Email. support@telestream.net Terms and times of support services vary, per the terms of your current service contract with Telestream.
Lightspeed Live Information, Assistance, FAQs, Forums, & Upgrades	Website: www.telestream.net/telestream-support/lightspeed-live/support.htm Support Email: support@telestream.net To access the Live Stream Web API Reference in the Live Stream application, click the three-dot icon in the upper right of the Live Stream web application, select the **About** menu and click **Web API Reference** to open the PDF document.
Telestream	Website: www.telestream.net Sales and Marketing Email: info@telestream.net Telestream 848 Gold Flat Road Nevada City, CA USA 95959
Telestream Reseller Support	If you purchased your Lightspeed Live server from a reseller, please contact your reseller for support.
International Reseller Support	Website: www.telestream.net See the Telestream website for your regional authorized Telestream reseller.
Telestream Technical Writers	Email: techwriter@telestream.net If you have comments or suggestions about improving this document, or other Telestream documents—or if you've discovered an error or omission, please email us.

Locating the Live Stream Service Tag

When contacting Telestream support about Lightspeed Live Stream always include your system's Service Tag. The Service Tag can be found in the Live Stream web application About dialog and is unique to every Lightspeed Live Stream server.

To open the About dialog, click the General Stream Settings icon in the upper right of the Live Stream interface and select *About* to open the About dialog.

Note: The Service Tag is only present after a Lightspeed Live server has been licensed. The Service Tag will continue to appear after the server license has expired.



Log Files for Live Stream

Log files can provide valuable information about the operation of Lightspeed Live Stream. The following describes how to download the log files and how to change the information they contain.

Downloading the Stream Log Files

The Lightspeed Live Stream log files can be downloaded from a browser. The contents of the log files may be helpful to Telestream Customer Support to troubleshoot system problems. You may want to access and save the log files before making a support call so you can email them to Telestream as part of the support process.

You can download the Live Services log files by entering the following URL in the address field of your browser:

http://[IP address]:18000/GetSystemLogs.zip

These log files are included in the download:

- Devices.csv
- EventLog-Application.evtx
- EventLog-System.evtx
- export.xml
- Processes.cvs
- Registry.cvs
- Services.cvs
- SNMPLogs.zip
- Stats.txt
- UserSNMPLogs.zip

The SNMP log files contain the following information:

- *LiveSourceService-[build number]-[date].log*—The Source service log records any activity with the sources. This includes various activities, such as loss of signal, change of format, sources being added, or sources being removed.
- *LiveStreamService-[build number]-[date].log*—The Stream service log records any encoder failures and the service starting.
- *PersistenceService-[build number]-[date].log*—The Persistence service log records license behavior, such as activated, deactivated, and so on.

Additional logs are available at:

- D:\Stream\SNMP Logs\packagingLog
- D:\Stream\SNMP Logs\traceLog

Changing Log Content Settings

The information created in the log files can be changed by editing settings in the configuration files that control logging file generation. Log files are located at

C:\Program Files\Telestream\Live Stream Server\

CAUTION: Before making changes to the configuration files, make backups by copying the existing files and saving them to a safe location.

The configuration file names are:

- ChannelEncode.exe.config
- ChannelProgram.exe.config
- LivePreview.exe.config
- LiveSource.exe.config

The following fields in the configuration files can be edited to change logging results:

- FacilityLog Level—Values are Off, Error, Warning, Information, Verbose, and All.
- DibLogLevel—Values are Off, Error, Warning, Information, Verbose, and All.

Note: The DibLogLevel value should only be changed for debug purposes, since it could affect the resources used.

- ConsoleLogLevel—Values are Off, Error, Warning, Information, Verbose, and All.
- ShowDibStackTrack—Values are true and false.
- IncludePidInLogFileName—Values are True and False.
- ShowDateBeforeLogLine—Values are True and False.
- ShowLogLevelInLogLine—Values are True and False.

Return Material Authorization (RMA) Procedure

If your Lightspeed Live server requires service of any kind, regardless of whether you purchased the Lightspeed Live server from Telestream or an authorized reseller, contact Telestream directly for a Return Material Authorization (RMA).

CAUTION: Except for the modular power supplies and disk drives, the Lightspeed Live server is a sealed device, with no user serviceable parts inside. You should never open the top cover or attempt to upgrade or alter the server. Doing so exposes you to electrical hazard, may damage the unit, and may invalidate your warranty.

Please contact Telestream for all internal service of the server:

- *Email*: support@telestream.net
- *In the US, telephone*: 1-877-257-6245

- *From international locations, telephon*e: 1-530-470-2036.

Provide your organization name, and contact information, the serial number of the inoperative unit, and request a Return Material Authorization.

Before returning your Lightspeed Live server, back up the entire contents of all server drives to protect against data loss. See Backing up the Lightspeed Live Server for details.