Live Capture

Administration Guide

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+ Live Capture ComponentPac 2025.1

Windows Server 2019

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Resource	Contact Information
Lightspeed Live Support	Website: telestream.net/telestream-support/lightspeed-live/support.htm Support Portal: https://support.telestream.net Support Email. support@telestream.net Terms and times of support services vary, per the terms of your current service contract with Telestream.
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Lightspeed Live Information | Assistance | FAQ | Forums | Upgrades	Website: telestream.net/telestream-support/lightspeed-live/support.htm Support Email: support@telestream.net
Telestream, generally	Website: telestream.net Sales and Marketing Email: info@telestream.net
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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 via email at support@telestream.net for all internal service of the server.

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 a Lightspeed Live Server* for details.

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Introduction

Telestream's Live Capture is an enterprise-class system hosted on a Lightspeed Live Server or a VM | cloud platform to perform real-time, enterprise-class live and tape-based media capture—encoding and serializing it into a file—for media and entertainment companies, corporations, government agencies, and educational facilities.

This guide—Live Capture Administration Guide—is intended primarily for those who are responsible for setting up and managing Live Capture systems. It includes topics on licensing, server installation and updates, plus Live Capture management topics.

The Companion Live Capture User Guide is primarily intended for operators—personnel who are using Live Capture to perform video capture tasks.

To install a Lightspeed Live Server in your facility, refer to *Installing & Managing Your Lightspeed Live Server*. You can also use this chapter to manage and monitor your servers.

Next, turn to *Configuring Vantage and Updating Live Capture* to configure your Live Capture system and start capturing video. In that chapter, you'll find an *Up and Running Checklist* which describes the initial tasks you should perform to get started.

Note: This guide uses different terms when referring to Live Capture platforms: The term *Lightspeed Live Server* refers to Telestream's high-performance Windows server, whose components are selected specifically to host Live Capture. The term *Live Capture server* refers more broadly on any supported platform hosting Live Capture: A Lightspeed Live Server, or a VM | cloud platform.

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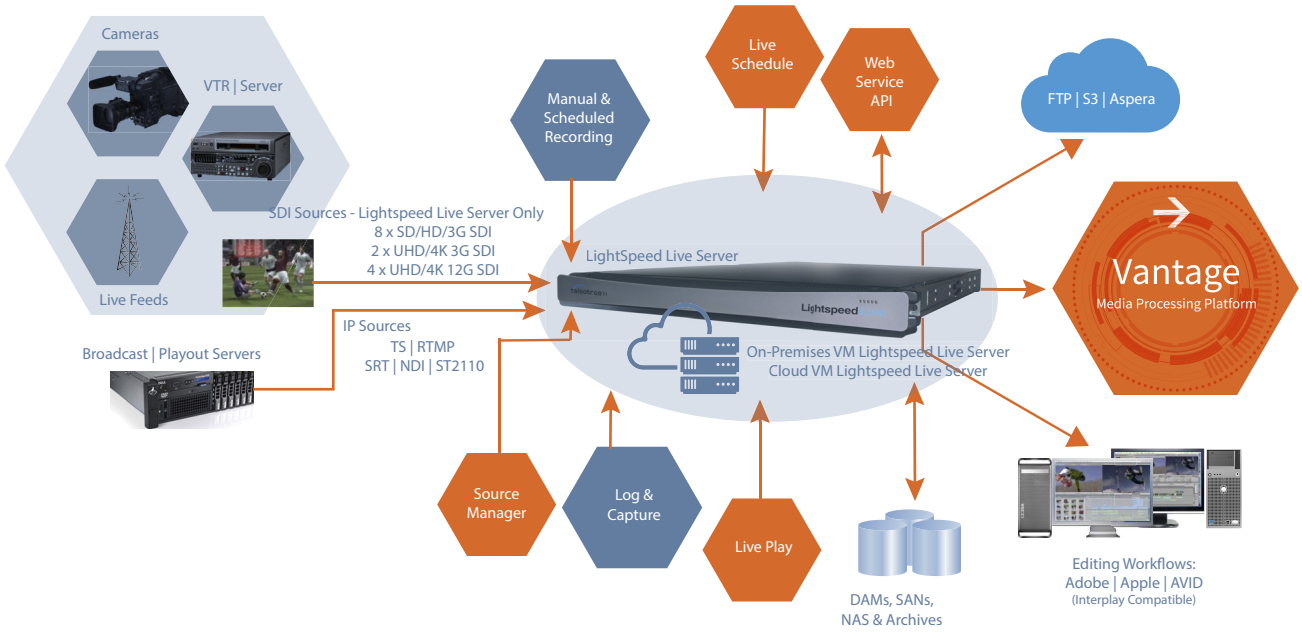
Live Capture Overview

Designed for demanding, enterprise-class broadcast and professional video capture applications, Telestream's Live Capture offers premium features and exceptional performance. Live Capture excels at performing demanding video ingest from similar or mixed format sources, while simultaneously creating multiple, high resolution and proxy files from any live source.

Live Capture is flexible and scalable. When hosted on a Lightspeed Live Server, Live Capture supports up to eight 3G HD SDI inputs with active loop through for monitoring, or up to two UHD/4K inputs with active loop through for monitoring. When equipped with 12G SDI, it supports two HD SDI or UHD/4K inputs.



Live Capture also supports IP sources—RTMP, MPEG2 Transport Stream, NDI, and SRT—and ST 2110 (via text / HTML SDP files or NMOS) when the Lightspeed Live Server or other platform is so equipped, with the ST2110 + NMOS option.

Lightspeed Live Capture encodes live streams in select formats and codecs. Live Capture processes video in 16-bit space to preserve source quality and encodes it in multiple video formats, while simultaneously creating high-resolution mezzanine H.264/AVC proxy files. Files are written directly to the Lightspeed Live Server's local RAID storage or to external shared NAS | SAN storage, or AWS S3 Cloud storage.

Live Capture is configured, operated, and controlled via the Live Capture and Tape Capture Web apps, and several *Live Application Program Interfaces* are provided for integration and control by other systems. Optional editing, scheduling and live playback web apps are also offered, plus optional SDI routing control via RouteMaster.

More Choices, More Flexibility

Live Capture offers a variety of methods to ingest video: 24/7/365 scheduled recording of live feeds, RS-422-controlled VTR tape capture, manual recording including gang control, DAI (SCTE-104) triggering (headless; no operator intervention), recurring segment creation, and automated control through a simple Web Service REST API.

Live Capture encodes captured video into MXF OP1a, QuickTime or Telestream TIFO format. To maintain closed captions and other ancillary data, Live Capture preserves it in MKV, MP4, Op1A, QuickTime and TIFO containers.

Media Platform Friendly

Live Capture creates growing files that directly support a wide variety of 3rd party Media Asset Management (MAM) and Non Linear Edit (NLE) solutions including Avid Media Central Production Management, Avid Media Composer, Adobe Premiere, DaVinci Resolve, and Apple Final Cut Pro.

Fast, Parallel Open Media Processing

As a standalone system, Lightspeed Live Capture acquires SDI video from independent input channels or through IP connections. You can join multiple Live Capture servers together to create a Live Capture array under a common control interface. Live Capture is integrated directly with Vantage, enabling unlimited workflow possibilities via Vantage's Telestream Media Framework.

Live Capture workflows support Open workflows to perform transcoding, packaging, and deployment in near real time, as the media is being captured. These media processing workflows complete within seconds following the end of media capture. You can also deliver Live Capture proxy (secondary) output in HLS | DASH format to Amazon S3 storage during file generation by the Capture action with a Push action immediately following, executing in Open mode.

File-Based Transcoding on Live Capture Servers

File-based transcoding directly on Live Capture servers is an optional, separately licensed feature. Transcoding options enable Vantage file-based transcoding *when not in use capturing media,* enabling you to utilize your Live Capture server for both live video capture and traditional file-based transcoding.

Note: Live Capture is integrated with Vantage Telestream Media Framework for ingesting live, live-linear and tape-based media for serializing media into files for processing in production, post-production and broadcast workflows. In the context of this guide, it is simply referred to as *Vantage*.
If you are performing concurrent ingest and encoding—using Open Workflows (Transcode while Ingest workflows)—you must perform transcoding workflows on a separate Vantage server, not on the Live Capture Server where ingest is executing.

When you're ready to get started, proceed to the *Up and Running Checklist*.

Live Capture Web Apps and Windows Services

Live Capture is comprised of programs implemented as Windows services, and web applications to provide users a graphic interface to utilize Live Capture's features and functionality.

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Live Capture Web Apps

Live Capture includes several client programs implemented as web apps:

- *Live Capture*—The Live Capture Web app (*Capturing Live Video*) is implemented by the Telestream Live Service and enables you to capture live video streams from SDI or from IP-based sources, and save them as files.
- *Tape Capture*—For tape-based media, the Tape Capture web application (*Capturing Tape Media*), which is implemented by the Telestream Live Service, enables you to capture tape-based media, typically in conjunction with a VTR.
- *Live Schedule Pro*—Live Schedule Pro is an optional, separately licensed feature for automating 24x7 capture events using a calendar interface, and includes optional RouteMaster for SDI router control.

  Live Schedule Pro is implemented in the Telestream Schedule Service, and enables you to create recording events you want captured for each source, and automatically starts and stops capturing video on an event-by-event basis, with optional SDI router control. Live Schedule Pro has a separate installer and is installed independently of other web apps.
- *Live Play*—Live Play is an optional, separately licensed product. The Live Play web app, implemented in the Telestream Playlist Service, is an enterprise-class software solution that provides flexible and scalable SDI video playback on Telestream's Lightspeed Live Server.
- *Source Manager*—Source Manager (*Managing Video Sources*), implemented in the Telestream Live Source Service, enables you to create, configure, and manage all of your video source inputs from a central web app.
- *Group Portal*—The Group Portal web app (*User Administration*) and also utilizes the Telestream Live Source Service. It enables you to create users with specific privileges for managing or monitoring servers in an array according to typical roles.

Live Capture Windows Services

Live Capture is supported by these Telestream services:

- Telestream Live Source Service
- Telestream Cloud Service

- Telestream Schedule Service (when Live Schedule Pro is installed)
- Telestream RouteMaster Service (when Live Schedule Pro is installed)

The Vantage domain installed on a Live Capture Server includes these programs:

- Vantage Management Console
- Vantage Workflow Designer

A Vantage domain for Live Capture also includes these Windows services:

- Vantage Analysis Service (requires optional licensing)
- Vantage Avid Service (requires optional licensing)
- Vantage Communicate Service
- Vantage Live Service
- Vantage Metadata Service (requires optional licensing)
- Vantage Metric Service
- Vantage Monitor Service
- Vantage Signiant Service (requires optional licensing)
- Vantage SDK Service
- Vantage Transcode Service (requires optional licensing)
- Vantage Transport Service

You can't install or execute other Vantage or Telestream services on a Live Capture Server without a specific license.

Live Application Program Interfaces

These APIs enable you to monitor and control your Live Capture system within a broader, web services-based system or create your own custom monitoring system. You can also submit and monitor capture jobs in Vantage using the Vantage API.

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You can also create a web services-based system to control capture operations beyond the functionality or capability of Telestream's Live Capture web applications, to meet your organization's requirements.

Vantage API

The Vantage API is required for any workflow integration, in addition to other APIs you may require.

Vantage provides an SDK to expose the REST API, which is designed to enable third-party programs to submit jobs to Vantage workflows, monitor and manage jobs, and access job's metadata and their files, and perform other tasks in Vantage. The Vantage API is language independent and supports the use of REST, SOAP or WCF protocols.

The Vantage API Reference is published on the Telestream web site for registered Vantage users.

Live Source API

You can use the Live Source REST API for creating and configuring SDI and IP sources for use in Live Capture via an external program / system. The Live Capture API is implemented in the Telestream Live Source Service.

The Live Source API is described at
`http://<Server>|localhost:15000/help/index.html`
where <Server> is the host name of the Live Capture server or keyword *localhost* when accessed locally.

Live Capture API

The Live Capture REST API enables you to automate and control Live Capture servers via an external program/system. The Live Capture API is implemented in the Vantage Live Service.

The Live Capture API is described at
`http://<Server>:17000 | 19000 | <Capture Action Port>/swagger/help/index.html`

where `<Server>` is the host name of the Live Capture server or keyword *localhost* when accessed locally.

Note: To display the Live Capture API help pages, create a Live Capture workflow in Workflow Designer. Configure it to use a Web Service trigger and configure it with server and port you're using. Activate the workflow, and then display the help pages.

The default port for Web Service triggers is 17000; the default port for Recurring Segment triggers is 19000. The port number may change, based on the port number specified in the target workflow's Capture action. If you are using multiple Capture workflows, you should configure each with a different port.

Live Capture Licensing

A Live Capture license is required for all Live Capture systems.

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Single Server Licensing

This topic describes required and optional licenses for a single-server Live Capture system for all models of Lightspeed Live Servers, as well as Live Capture installed on a VM | cloud platform.

To obtain licenses or obtain licensing information or assistance, please contact your Telestream Representative. Also see *Obtaining Support | Information | Assistance*.

Note: License files may contain one or more license policies, and there may more than one license file in a Vantage domain. The number of license files is immaterial; only the license policies within the file(s) are relevant. License installation is described in the Domain Management Guide.

You add Live Capture license files to the Vantage domain, where the license policies are extracted from the file(s) and stored in the Vantage database for utilization.

You use the Vantage Management Console to add, view, and manage licenses. See the Vantage Domain Management Guide directly in the console, for details.

Software-Only Licensing

Software-Only Live Capture requires a Live Capture Software license. It enables these features:

- Open workflow support in Vantage
- Perform one capture (execute one workflow) at a time per license instance.

Use of a Live Capture Software license imposes these limitations:

- GPU-based encoding is supported on systems with an Nvidia GPU.
- Comprimato JPEG2000 encoding requires an additional license. (Comprimato JPEG2000 encoding typically requires higher capacity than other encoding.)
- You can have multiple, active Capture workflows, but you can only perform a single capture operation at a time. Simultaneous captures are not permitted.
- Pass-through GPUs are supported, but not required.

Array Licensing

Note: License files may contain one or more license policies, and there may more than one license file in a Vantage domain. The number of license files is immaterial; only the license policies within the file(s) are relevant. License installation is described in the Domain Management Guide.

When you add a license file to your Vantage domain, the license policies are extracted from the file(s) and stored in the Vantage database for utilization. You use the Vantage Management Console to add, view, and manage licenses.

- A Live Capture license includes a Vantage array license—one license per server.
- All Vantage servers joined together with Live Capture servers also require an array license for each Vantage server. If you have a stand-alone Vantage domain and are joining it to a separate Capture server—creating an array, you require an array license for it.

These examples illustrate the requirements for licensing Vantage domains including Live Capture servers, except for those systems purchased as a single server.

Single Server Vantage Domain Adding Live Capture

A single server Vantage domain is being joined to a Live Capture server—this requires two array licenses. For this system you order a single-server array license for the Vantage server. You receive a license file containing array licenses for both servers; one for the Vantage server and one for your Live Capture servers.

New Vantage Arrays Including Live Capture

Example 1: A new system consisting of two Live Capture servers and two Vantage servers in an array requires four array licenses. For this system you order a two-server array license for the Vantage servers. You receive a license file containing array licenses for four servers; two for the Vantage servers and two for your Live Capture servers.

Example 2: A new system consisting of five Live Capture servers and three Vantage servers in a Vantage array requires eight array licenses. For this system you order a three-array license for the Vantage servers. You receive a license file containing array licenses for all eight servers; three for the Vantage servers and five for your Live Capture servers.

Existing Vantage Arrays When Adding Live Capture

Example: You are adding Live Capture servers to an existing Vantage domain that already has array licensing. Thus, no additional array licensing is required. However, you should update the existing Vantage license file to include the additional Live Capture server.

In a mixed Vantage/Capture array, you can't host Transcoding services on the Capture servers, or failures of Capture jobs and other, non-capture Vantage jobs will occur.

Remove the Vantage Transcode service from Live Capture servers via the Vantage Management Console.

Optional Licenses

- Basic Single File Analysis (LSL-ANLZ-SW)—includes single-file analysis for curtains, letter-boxing, Telecine, black detection, slate/spot detection, macro-blocking, loudness measurement with dialog detection and gating controls for compliance with CALM Act, ATSC A/85, BS-1770-2 and EBU R128, and more. Includes PSNR measurement for two-file QC analysis. Does not include first year of Software Annual Maintenance and Support which must be ordered at time of purchase. Refer to Maintenance section for more information. Intended for use on Live Capture systems while no ingests are being performed.
- Extended Single File Analysis (LSL-ANLYZ-PRO-SW)—Includes all capabilities of Basic Single File Analysis, with additional capabilities for Dolby Atmos audio loudness, Dolby Vision metadata extraction, Dolby E audio detection and analysis, compliance checking, PDF reporting, and integration with MediaInfo for extended media properties. Intended for use on Live Capture system while no ingests are being performed.
- JPEG2000 codec option for Live Capture (LS-LIVE-CAP-J2K)—enables JPEG2000 SD/HD recording up to 1080p60.
- MPEG2-TS with Manzanita Option for Live Capture (LS-LIVE-TS-OPTION)—providing support for MPEG2 Transport Stream container with Manzanita multiplexing. Supports Live Capture's MPEG-2 and x264 video codecs.
- Avid Integration (LS-LIVE-AVID-OPT)—enables the creation of Avid-compatible MXF OPAtom and AAF media files for use directly in a standalone Media Composer edit system, or written in real time to Avid shared storage and checked-in into Avid Interplay. This option is available only for standalone or multiple channel Live Capture systems. Live Capture servers that are integrated into Vantage domains use the Vantage Avid Interplay Option (V-AVID).
- Vantage Metadata Conversion (V-METADATA-SW)—enables ability to transform XML files, create or populate metadata labels, and perform Web Services notification in Web Services notification, Populate, Transform, Extract, Gather and Archive actions.
- Array Pro upgrade for Capture (LSL-ARRAY-PRO-UPG)—matches the Array Pro license for connection to Vantage since you can’t mix regular Array with Array Pro on Vantage domains. This allows Open Workflows that include Capture but start with Watch and Receive origin actions. This is required for workflows that update other systems using a typical Receive workflow—Receive > Populate > Notify. For example, Avid Interplay metadata and Edit While Capture in Media Creation 2022.2 and later.
- Vantage Transcode (V-XCODE-SW)—includes Vantage Workflow Designer, SD & HD New Media, Edit, H.264 and MPEG-2 Transcoding Format support, FTP/Network folder workflow support, Enhanced Video Processing.

- Vantage Transcode Pro (V-XCPRO-SW)—includes Vantage Workflow Designer, SD & HD New Media, Edit, H.264 and MPEG-2, Broadcast Server and MXF transcoding format support, and FTP/Network folder workflow support. Allows creation of AAF files for Media Composer (without Interplay).

SDI Source Video Formats

Live Capture supports the following SDI source formats, at indicated frame rates:

Source Rate	23.98	24	25	29.97	30	50	59.94	60
SD NTSC 525i				■				
SD PAL 625I			■					
HD 720P						■	■	■
HD 1080p	■	■	■	■	■	■	■	■
HD 1080PsF	■	■	■	■	■			
HD 1080i			■	■	■			
UHD 3840x2160p	■ *	■ *	■ *	■ *	■ *	■ *	■ *	■ *
UHD 3840x2160PsF	■	■	■	■ *	■ *	■ *	■ *	■ *
4K 4096x2160PsF	■	■	■					

* Image division and 3G level are detected automatically based on VPID data. If VPID data is not present or is incorrect, image division must be manually set. In the Source Manager web app, display the Configure Source panel (when Video Mode is specified as QuadLink Video) and set Quad Link Image Division to 2SI. See *Configuring SDI Sources* for details.

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

SDI Audio Formats

- 16-channel 24-bit Little Endian SDI embedded, 48 kHz synchronous

Input Reference

- *SD/HD*—Reference is derived from an internal free-run clock on each SDI port or from external reference.
- *QuadLink UHD*—Reference is derived from SDI port or from external reference.

Output Reference

- *SD/HD*—Reference is derived from internal free run clock or external Bi-Level or Tri-Level (TLS) reference source. See *Using External Reference (REF) for SDI Playout* for details.

Note: All 16 UHD audio channels are provided on SDI 1 and SDI 5 (model-dependent).

Lightspeed Live Server Specifications

Telestream's Lightspeed Live Server (see *Lightspeed Live Server Specifications*), is a high-performance, high-capacity Windows platform, specifically configured as a media processing platform to host Live Capture and Live Stream. Telestream offers several models of Lightspeed Live Servers—in four and eight port configurations—to meet application demands and provide improved performance as technology improves.

As of the date of this publication, Telestream offers the C2+, C4 and C5 models. Other models are supported, but are no longer available.

Note: The *Lightspeed Live Server* and *Lightspeed Server* are different hardware platforms. Lightspeed Live Server hosts Telestream's Live products, including Live Capture; while Lightspeed Server hosts Vantage domains.

User guides and other documentation are provided on flash drive. The same guides are also published on the Telestream web site.

Topics

Lightspeed Live Server Major Features

This table summarizes the Lightspeed Live Server major features.

Components	Description
Operating System	Windows Server 2019
RAM	ECC DDR4 (speed and amount vary by model)
CPU	Dual Multi-Core CPUs
GPU	1 GPU
OS Drives	1 SATA SSD drive for Windows OS (top right-most slot) 1 optional OS SSD drive configured in RAID 1 (bottom right slot)
Storage Drives	SATA SSD or SAS hard drives (capacity quantity and size vary by model)
SAS Controller	Supports up to 8 SAS3 or SATA3 media drives
PCIe Option Slot	1 half-height PCIe 3.0 x8 slot or 1 full-height PCIe 3.0 x16 slot (model-dependent)

Components	Description
SDI Video Input/ Output	**Gen 1| C2 (Discontinued)**: One 4-port DIN 1.0/2.3 3G SDI card plus LTC port, for four SH/HD or one QuadLink UHD Processor; affinities should be balanced, and assigned affinity value 1. **C2+**: One 4-port DIN 1.0/2.3 3G SDI card plus LTC port and REF synch port, for four SH/HD (two in and two out) or one QuadLink UHD Processor OR One dual port Mellanox ConnectX-6 Dx card. **C3 (Discontinued)**: Windows Server 2016 | Windows Server 2019. One 8-port DIN 1.0/2.3 3G SDI card plus LTC port for eight SH/HD or 2 QuadLink UHD. Processor affinities should be balanced. With Preferred Processor set to Automatic, SDI 1 | 3 | 5 | 7 are assigned affinity value 1 and SDI 2 | 4 | 6 | 8 are assigned affinity value 2 to maintain a deterministic balance. OR One 4-port BNC video card for two 12G SDI UHD in and two out, REF synch port. **C4**: One 8-port DIN 1.0/2.3 3G SDI card plus LTC port for eight SD/HD or two QuadLink UHD. Processor affinities should be balanced. With Preferred Processor set to Automatic, SDI 1 | 3 | 5 | 7 are assigned an affinity value of 1 and SDI 2 | 4 | 6 | 8 are assigned an affinity value 2 to maintain a deterministic balance. OR One 4-port BNC video card for four 12G SDI in or two 12G SDI in and two out, REF synch port. OR One dual port Mellanox ConnectX-6 Dx card. **C5**: Dual 8-port 3G SDI. One half-height 8-port card and one full-height 8-port card plus LTC port and REF synch port. Cards are bonded together to provide 8 SD/HD or two QuadLink UHD in and out with confidence monitoring. C5 cards are identified as 0 and 1, and referenced in web apps with both the card number and port, as *SDI 0:1* or *SDI 1:5* for example. All SDI ports are permanently configured in loop through mode. SingleLink Loop Thru ports 0:1-0:4 loop to ports 0:5-0:8 on card 0 and 1:1-1:4 loop to ports 1:5-1:8 on card 1, or QuadLink Loop Thru port 0:1 loops to 0:2 and 1:1 to 1:2.
USB 3.0	Two front plane, two backplane USB ports

Components	Description
Data Ethernet	Four 10G Ethernet 10GBase-T ports (backplane) **C5**: Two RJ45 1Gb Ethernet ports (backplane, lower) and two 10GbE with SFP+ ports.
ST 2110 Media Fiber/Ethernet	**C2+ | C4**: optional 25/100Gb Fiber/Ethernet NIC with two SFP+ ports for ST 2110 processing with SMPTE 2022-7 fall-back, and two RJ45 1Gb Ethernet ports (backplane, lower). When installed, you can't install an SDI video card.
VGA Monitor	One VGA monitor port
AC Power	Two redundant AC inputs, 100-240 Volts, 4.5-9.5 Amps, 50-60 Hz.
RS-422	4-port RS-422 VTR interface kits (Capture only). Optional, purchased separately. See *Connecting VTR Systems*.
Operating Environment	10 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" disk drives. The drive bays on the left (viewed from the front) support SAS3 media drives, four of which are included as standard. You can configure these eight storage drives 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 exact manufacture and model of drive. Drives vary by model; see *Obtaining Support | Information | Assistance*.

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 CPUs and other components that require cooling. The power supply module also includes a cooling fan.

SDI Video Cards

SDI video cards are installed in one or more PCIe card slots.

Note: For C2+ | C4 | C5, an optional, 2-port 25/100Gb Ethernet NIC enables ST 2110 capture. These servers support either an SDI card or a 25/100Gb Ethernet card, but not both in the same server.

Each of these cards provide one port for analog Linear Time Code (LTC) for use across all SDI input signals. As of October, 2022, the 4 and 8-port cards have an added REF synch port for synchronized SDI playout (see *Making Data and Signal Connections*).

- **4-Port 3G SDI Card (C2 | C2+)**—provides four SingleLink 3G SDI ports enabling four SD / HD signals or one QuadLink UHD signal. Provides one LTC port. For details, see *4-Port 3G SDI Card*.
- **4-Port 12G SDI Card (C2 | C4)**—provides four UHD 12G SDI ports with BNC connectors, enabling two UHD input signals and two output signals. Provides one LTC port. Active loop through is not supported on a server equipped with a 12G card. For details, see *4-Port 12G SDI Card*.
- **8-Port 3G SDI Card (C4 | C5)**—provides eight SingleLink 3G SDI ports with BNC connectors, enabling eight SD / HD signals or two QuadLink UHD signals. Provides one LTC port. For details, see *8-Port 3G SDI Card*.
- **8-Port 3G SDI Card with Ref and LTC (C4 | C5)**—provides eight SingleLink 3G SDI ports with BNC connectors, enabling eight SD / HD signals or two QuadLink UHD signals. Provides one LTC port and one REF port. For details, see *8-Port 3G SDI Card with Ref and LTC Connectors*.
- **Dual 8-Port 3G SDI Cards with Ref and LTC (C5)**—one half-height, and one full-height card, provides sixteen SingleLink 3G SDI ports with BNC connectors across 2 cards, enabling eight input SD / HD signals and eight output signals or two UHD input signals and two output signals. Both cards provide an LTC port; the full-height card provides a REF port. For details, see *16-Port (dual 8 port) 3G SDI Cards with Reference and LTC*.

Data Ethernet Network Interface Cards

On servers Gen 1, and C2 through C4, four 10GbE Ethernet backplane ports are provided for network connectivity and video playback.

C4 models manufactured after October 2022 have two RJ45 1Gb Ethernet ports.

On the C5, the top two Ethernet ports (with SFP28 connectors) support 10G Ethernet. the two bottom Ethernet ports (RJ45) are 1G ports.

Media Fiber/Ethernet Network Interface Cards

On the C2+ and C4, an optional 2-port, a Mellanox ConnectX-6 Dx Ethernet NIC with Rivermax Media Library for ST 2110 capture may be utilized. On servers equipped or retro-fitted with this card, SDI cards are not supported.

GPU

The on-board GPU accelerates video processing and media creation. Using the GPU in combination with the Lightspeed Live Server's powerful dual CPU processors enables capturing media from multiple live sources.

Expansion Card Slots

Each Lightspeed Live Server provides optional full- or half-height PCIe cards, installed by Telestream.

In order to ensure optimal product performance and warranty coverage, ensure that Telestream products are used in accordance with the following product policy. It is critical that this 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.
- You can only use Telestream-qualified add-in cards. For the current list, refer to the Lightspeed Live Server product sheet on the Telestream.net web site. Using untested or 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.

RS-422 VTR Interface Kit Option

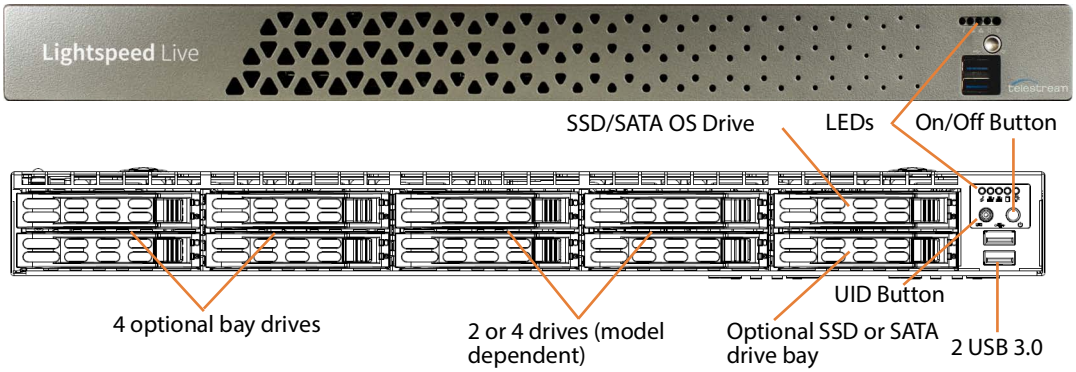
The optional *RS-422 VTR Interface Kit* (4-port and 8-port versions) provides the ability to connect up to four or eight VTR units to the Lightspeed Live Server, and allows a VTR to be remotely controlled by the Lightspeed Tape Capture web application to facilitate conversion of tape-based media into digital video files.

Front Panel

The Lightspeed Live Server has a removable front bezel. Remove the bezel to access the system interface buttons and LEDs, drives, and front USB ports.

Front Panel Features

The front bezel provides visibility of the system monitoring LED indicators and allows pinhole access to the recessed power button. This graphic illustrates the front bezel and below, the bays exposed when the bezel is removed:



LEDs (left to right)

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

Power On/Off Button

The power button is directly below the LEDs. Press the power 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 close all web apps and client programs and shut down the Vantage domain and log out of Windows before cycling power.

UID Button (hidden)

On Lightspeed Live Servers with the bezel shown above, the UID button (which is mounted on the front panel immediately to the left of the power button), is hidden by the bezel. To utilize the UID button, first remove the bezel. The UID button alternately turns on and off the blue front and rear panel UID LED (far left), used to locate a particular unit among many units in a rack or server room.

On Lightspeed Live Servers utilizing the former bezel, the button is accessible without removing the bezel.

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 Ports and Connectors

These are the rear panel ports and connectors:

- Two redundant AC power connectors—connect to a 10-amp or greater AC source
- Four 10GBase-T Ethernet LAN ports—connect as required to LAN
- C4 (after October 2022) | C5—Two 1Gb Ethernet LAN Ports and two 10GbE SFP+ Ethernet ports
- Two USB 3.0 ports—connect as required to keyboard, mouse, or other serial device. When used for RS422 VTR control, use of a hub is not permitted.
- One IPMI-dedicated Ethernet port, which should not used for other purposes
- One VGA monitor port
- One COM control port (not used)
- One 3G SDI card with 4 | 8 ports
  OR
  One 12G SDI card with 4 ports
  OR
  C2+ | C4—One Mellanox ConnectX-6 Dx Ethernet NIC
- C5 only—Two 3G SDI card with 16 ports total.

Note: On supported servers, one SDI card or one 25/100Gb NIC is permitted—SDI and Ethernet NIC cards can not be installed in the same server.

- One analog LTC port on SDI-equipped servers; none on ST 2110 servers.
- One External Ref port on selected cards manufactured after October 2022.

On supported servers, you can order additional factory -installed PCIe cards in the PCIe expansion slots. For details of each backplane component/connector, see *Making Data and Signal Connections*.

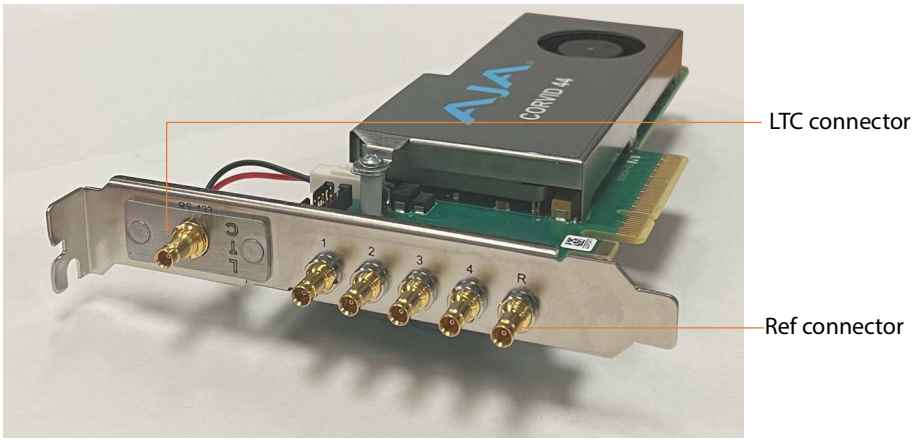
SDI Video Connectors

Each Lightspeed Live Server includes one or more of several models of SDI video cards. Two cards are supported in Live Capture. For an overview of cards by server, see *SDI Video Cards*.

Note: On a C4 server, you can optionally install a 2-port 25/100Gb Ethernet NIC in place of the SDI card.

4-Port 3G SDI Card with Ref and LTC Connectors

The 4-port 3G SDI card has 6 DIN 1.0/2.3 connectors with 6 DIN 1.0/2.3 to BNC adapter cables (shown here right side up):

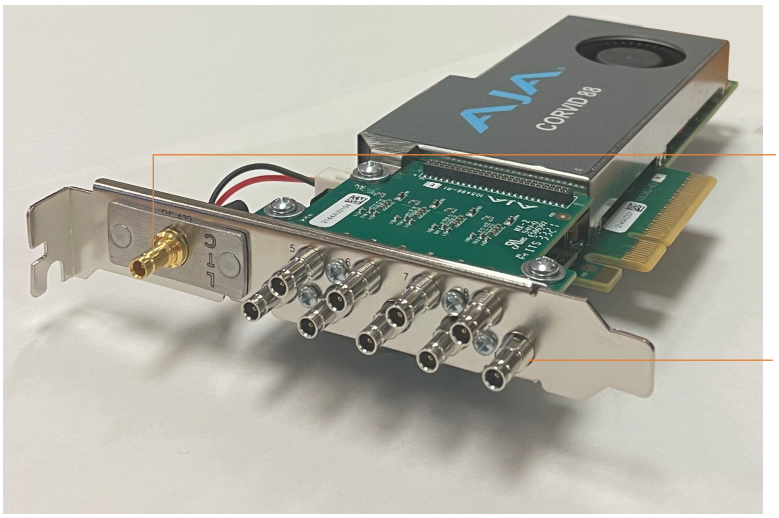


Note: The 4-port SDI card is inserted upside down into the backplane at the bottom right corner. Refer to imprinted labels (1 2 3 4) for SDI connection, R for Reference cable connection and LTC for LTC cable connection. The RS-422 port is unused.

- **4 SDI Ports (1-4):** SD/HD 3G x 1080 video formats; audio 16-channel, 24-bit SDI embedded, 48 kHz synchronous
- **Input Reference (R):** Bi-level and Tri-level (TLS) reference input
- **Linear Time Code (LTC):** LTC timecode input

8-Port 3G SDI Card with Ref and LTC Connectors

The 8-port 3G SDI card has 10 DIN 1.0/2.3 connectors with 10 DIN 1.0/2.3 to BNC adapter cables:

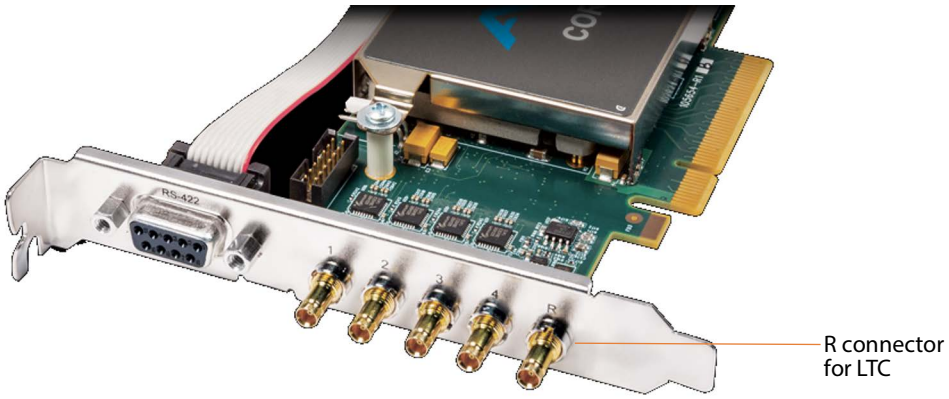


Note: Refer to imprinted labels (1 through 8) for SDI connection, R for Reference cable connection and LTC for LTC cable connection.

- **8 SDI Ports (1-8):** SD/HD 3G x 1080 video formats; audio 16-Channel, 24-bit SDI embedded, 48 kHz synchronous
- **Input Reference (R):** Bi-level and Tri-level (TLS) reference input
- **Linear Time Code (LTC):** LTC timecode input

4-Port 3G SDI Card

The 4-port 3G SDI card has 5 DIN 1.0/2.3 connectors with 5 DIN 1.0/2.3 to BNC adapter cables (shown here right side up):



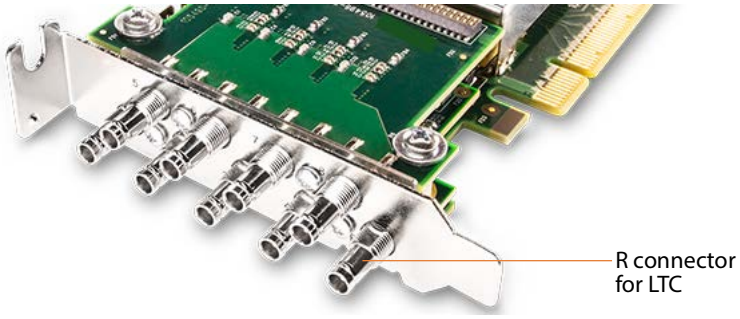
Note: The 4-port SDI card is inserted upside down into the rear panel at the bottom right corner. Refer to imprinted labels (1 2 3 4) and R for proper cable connection. The RS-422 port is unused.

- **4 SDI Ports (1-4):** SD/HD 3G x 1080 video formats; audio 16-channel, 24-bit SDI embedded, 48 kHz synchronous
- **Input Reference (R):** LTC timecode input

8-Port 3G SDI Card

The 8-port 3G card has 9 DIN 1.0/2.3 connectors, which you can convert to BNC with the included DIN 1.0/2.3-BNC converter cables. For UHD, SDI-1 through SDI-4 and/or SDI-5 through SDI-8 (model-dependent), you can use BNC connectors to support Ultra HD input.

The UHD signal is QuadLinked—connected to all four ports (SDI-1 through 4 or SDI-5 through 8 depending on the model). All other resolutions use one port per input:

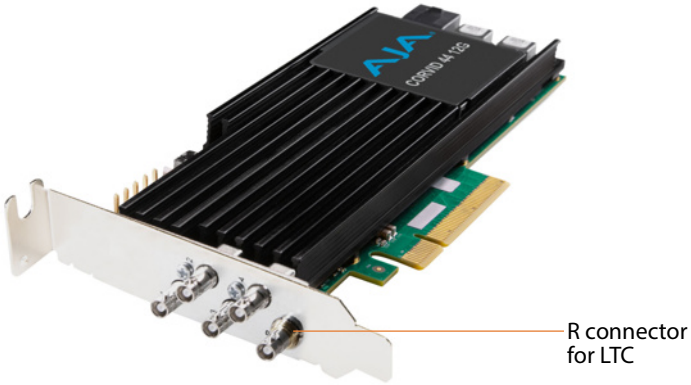


Note: Refer to imprinted labels (1 through 8) and R for proper cable connection.

- **8 SDI Ports (1-8):** SD/HD 3G x 1080 video formats; audio 16-Channel, 24-bit SDI embedded, 48 kHz synchronous
- **Input Reference (R):** LTC timecode input

4-Port 12G SDI Card

The 4-port 12G card has 5 BNC connectors:



Note: Refer to imprinted labels (1 through 4) and R for proper cable connection.

- **4 SDI Ports (1-4):** 12G x UHD1080 video formats; audio 16-Channel, 24-bit SDI embedded, 48 kHz synchronous for 2 input operation.
- **Input Reference (R):** LTC timecode input

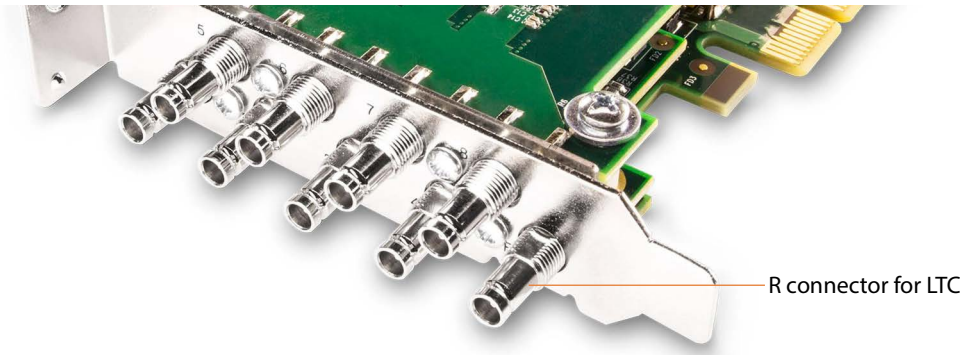
16-Port (dual 8 port) 3G SDI Cards with Reference and LTC

Two 8-port 3G cards, bonded. Each provides 9 DIN 1.0/2.3 connectors with 9 DIN 1.0/2.3 to BNC adapter cables and is used for 4 input (1-4) and 4 output (5-8) on each card. LTC is provided on both cards; a REF synch port is provided on the full-height card and is bonded to the other, use in both cards, for synchronized SDI playout (see *Using External Reference (REF) for SDI Playout* and *Making Data and Signal Connections*).

In this dual-card implementation, the half-height card in the center bay is referred to as card 1 in web apps; card 0 is the full-height card in the right-hand bay.

8-Port 3G SDI Card with LTC

This half-height 8-port 3G card is installed in the top center bay on the C5 server, with 4 inputs (1-4) and 4 outputs (5-8). It has 9 DIN 1.0/2.3 connectors with 9 DIN 1.0/2.3 to BNC adapter cables, plus a 9 DIN 1.0/2.3 connector for LTC:



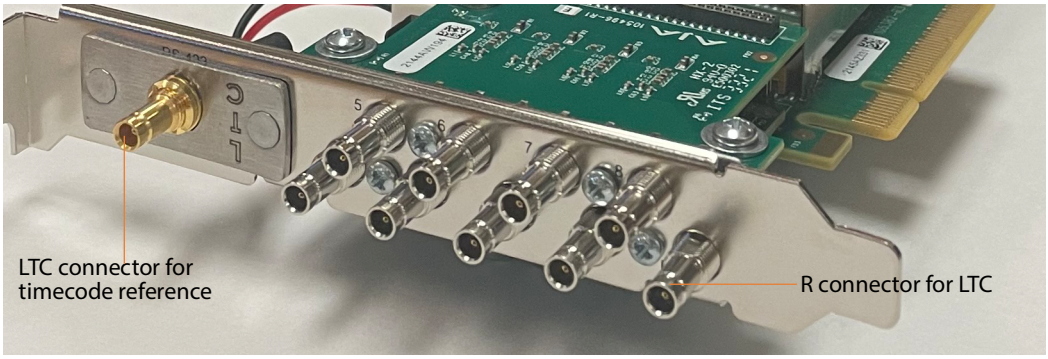
Note: Refer to imprinted labels (1 through 8) and R for proper cable connection.

- **8 SDI Ports:** SD/HD 3G x 1080 video formats; audio 16-Channel, 24-bit SDI embedded, 48 kHz synchronous. 1-4 in; 5-8 out
- **Input Reference (R):** Provides LTC timecode input

8-Port 3G SDI Card with LTC and REF

This full-height, 8-port 3G card is installed in the bottom right bay on a C5 server manufactured after October, 202, with 4 inputs (1-4) and 4 outputs (5-8). It has 9 DIN

1.0/2.3 connectors with 9 DIN 1.0/2.3 to BNC adapter cables, plus a 9 DIN 1.0/2.3 connector for LTC and one for REF:

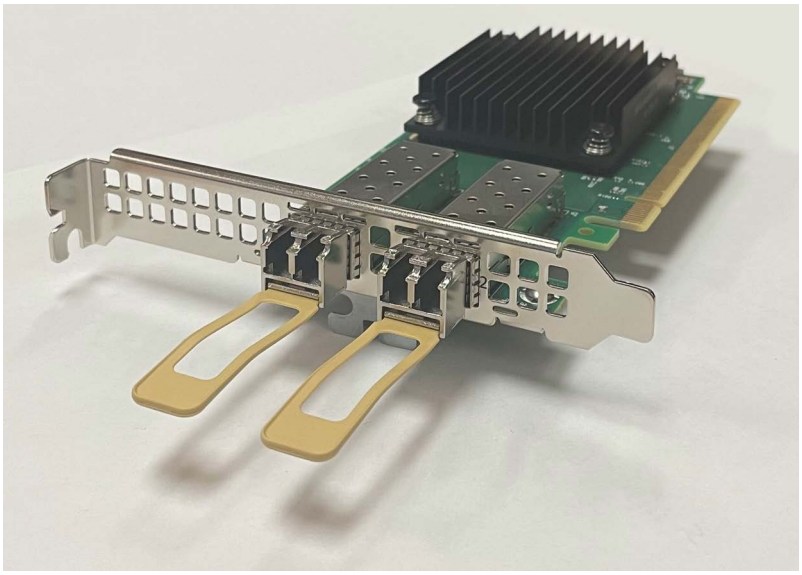


Note: Refer to imprinted labels (1-8) and R and LTC for proper cable connection.

- **8 SDI Ports (1-8):** SD/HD 3G x 1080 video formats; audio 16-Channel, 24-bit SDI embedded, 48 kHz synchronous. 1-4 in; 5-8 out.
- **Input Reference (R):** LTC timecode input.
- **Linear Time Code (LTC)**: LTC timecode input, bonded to other card.

Fiber/Ethernet Media LAN Connectors

On C2+ and C4 servers, a Mellanox ConnectX-6 NIC card may be installed in place of the SDI card. It provides support for ST 2110 video, using two SFP ports:



Live Capture Software-Only Server Requirements

You can host Live Capture Software-only on supported servers and platforms which meet the minimum Vantage resource requirements intended for Live Capture operation.

In addition to vendor-specific requirements, the system must be configured to meet the general requirements of a platform being utilized to host Vantage, as specified in the Vantage Virtual Domain Management Guide, which is available at Telestream.net.

Compressed IP sources such as NDI, SRT, RTMP and MPEG2-TS are supported; hardware-based SDI and ST 2110 sources are not supported.

You should qualify your Vantage platform for expected concurrency for your workflow configurations before putting the platform into production—monitoring CPU, memory, disk throughput and GPU usage (if applicable). A safe operating range is 60 to 80 percent peak utilization.

Topics

Guidelines

- CPU requirements of 24 core, single or dual socket may be increased as needed for more resource intensive scenarios—conducting multiple concurrent recordings, UHD capture, or resource-intensive transcoders such as long GOP x264 based broadcast formats, or JPEG2000 archival, for example.
- If the host is a dual-socket system but the system is licensed for only one recording instance, system CPU resources may be better utilized by disabling the Live source channel's Assign Processor control.
- One Capture action per workflow is allowed.
- Live Capture operates differently on systems without GPU. If a supported GPU is not detected by the Live Capture installer, AVC- and HEVC-based formats for both primary and secondary outputs are disabled in Capture workflows.
- To force GPU usage, select the Enable GPU encoding option during installation. Tested GPU include P4000 Quadro with v471.43 drivers on Windows 2019, plus RX4000 and RTXA4000.

VMWare Server Requirements

VMWare ESXI Enterprise, versions 6.7-8.01 are supported and you can scale it up to four concurrent channels per VM. Dedicated, pass-through NVIDIA GPU's are supported but not required for most media formats.

This table summarizes the requirements of a VMWare platform being utilized to host Live Capture for single-channel HD capture.

Components	Description
VMWare	VMWare version 6.7, 8.0.1
RAM	16GB minimum; 32 GB+ recommended. Vantage consistently uses significant RAM for media transcoding. Telestream recommends that some or all memory resources be dedicated (reserved) in the infrastructure system.
OS Volume	100GB minimum allocated for Vantage service installation.
Media Storage RAW Capacity	1TB SSD vmdk or greater
Media RAID Type (default)	RAID 5 or 6 recommended.
Ethernet NIC	10GbE recommended. (see https://kb.vmware.com/s/article/1001805 1Gb+ low-latency management connectivity and access to the Vantage MS SQL database instance. Networking infrastructure must allow for high-speed access to shared storage.
DNS	Each instance must be addressable via forward and reverse DNS entries or via a local host table DNS record matching the Windows host name. Virtual instances must be reachable within 60 seconds of instantiation.

AWS EC2 Server Requirements

This table summarizes the requirements of an AWS EC2 platform being utilized to host Live Capture SW for single-channel HD capture.

Components	Description
RAM	16 GB minimum recommended
OS Drive	100GB SSD or greater
Media Storage RAW Capacity	1TB SSD EBS or greater
Media RAID Type (default)	RAID 5

Installing & Managing Your Lightspeed Live Server

Installing your Lightspeed Live Server includes mounting it in an equipment rack, making video, network and power connections, and configuring it for operation. Detailed, step-by-step instructions are presented here for each of these tasks.

Other responsibilities include OS management, maintaining the server, and monitoring a Lightspeed Live Server during operation. These topics apply to all server models unless otherwise noted.

Note: For Live Capture configuration and management, see *Capturing Live Video*. For Vantage configuration for utilization with Live Capture, see *Configuring Vantage and Updating Live Capture*.

Topics

Installing a Lightspeed Live Server

This topic provides instructions for unpacking a Lightspeed Live Server and installing it safely and securely in a computer server rack, and making the required connections.

If you purchased the optional RS422 VTR Interface Kit, you should make plans for co-installation and VTR connection in the rack in conjunction with the Lightspeed Live Server. For complete instructions on installing the RS422 VTR Interface Kit and connecting a VTR, see *Connecting VTR Systems*.

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, see *Obtaining Support | Information | Assistance* to obtain service.

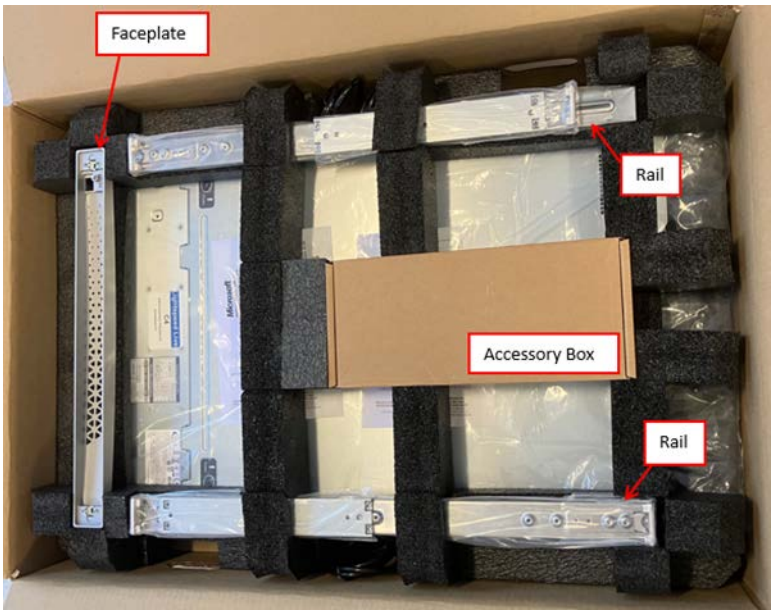
Note: Before proceeding, collaborate with your network administrator to determine computer and network setting requirements.

Topics

Unpacking the Server

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. In the event of 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 supports the full weight of the server and shipping container without tipping.

Whats in the Box

Inside the main box are these items...

- Lightspeed Live Server
- Face plate
- Rack rails
- UK power cords (2)
- EU power cords (2)
- Accessory box

Inside the accessory box you'll find these items...

- Lightspeed Live info sheet that describes the content of the USB drive,
- USB drive with documentation & installers,
- DIN 1.0/2.3-to-BNC cables
- Rack screws
- North America power cords (2)
- Optional SFP adapters—for add-on fiber cards or Mellanox card.

Connecting to the Mellanox Card QSFP Ports

The Mellanox card has two QSFP ports. If you are not using QSFP28 connectors, you should connect SFP28 cables using the SFP adapter. Otherwise, the fiber cable inserts directly to the SFP/QSFP connectors.

The Mellanox card accepts Ethernet cables using these SFP connectors:

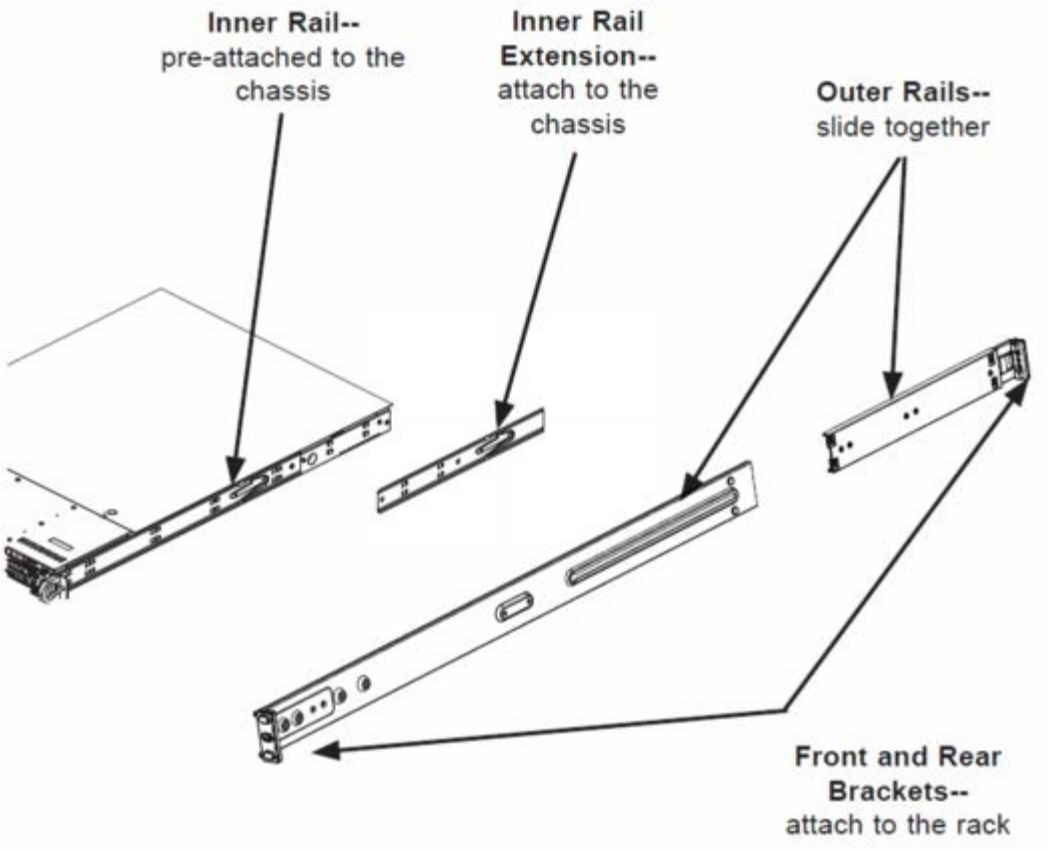
- **SR - 1**. Mellanox MMA2P00-ASHT Compatible SFP28 25GBASE-SR 850nm 100m DOM Duplex LC/UPC MMF Optical Transceiver Module
- **LR - 1**. Mellanox MMA2L20-AR Compatible SFP28 25GBASE-LR 1310nm 10km Duplex LC/UPC SMF DOM Optical Transceiver Module
- **SFP56/28 Adapter**. Mellanox MAM1Q00A-QSA28 Compatible QSFP28 100G to SFP28 25G Adapter Converter Module with DDMI.

Rack-Mounting Your Lightspeed Live Server

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.

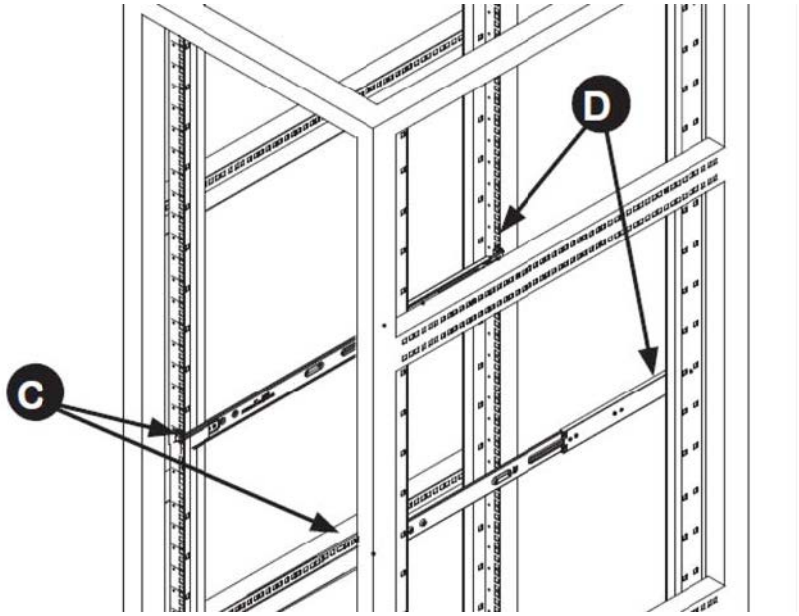


Align the extension holes with the hooks on the side rail and slide the extension forward to engage the hooks until the quick release bracket snaps into place. For added stability, you can secure the extension with a screw.

Assemble the outer rails by sliding the front and rear sections together.

Installing Outer Rails into the Rack

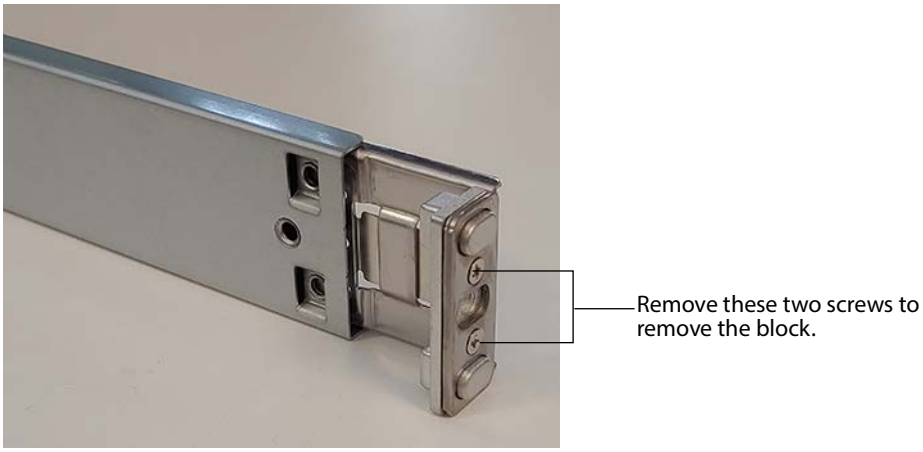
Next, install the outer rails into the rack as shown in this figure:



Proceed to the appropriate topic for your rack—round hole or square hole.

Installing in a Round Hole Rack

If your rack has round threaded holes, first remove the aluminum block at the end of the rail via the 2 screws, as shown here:



1. Push the rail into the rack until the quick release bracket snaps into place, securing the rail to the rack.
2. Extend the rear of the rail to align it with the holes on the rear of the rack (D).
3. Push the rail into the rack until the quick release bracket snaps into place, securing the rail to the rack.

Installation in Square Hole Rack

1. Align the square pegs on the front of the rail with the square holes in the front of the rack (C).
2. Push the rail into the rack until the quick release bracket snaps into place, securing the rail to the rack.
3. Extend the rear of the rail to align its square pegs with the square holes on the rear of the rack (D).
4. 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 from falling and becoming damaged, be sure the rails are solidly in position and ready to support the full weight of the chassis.

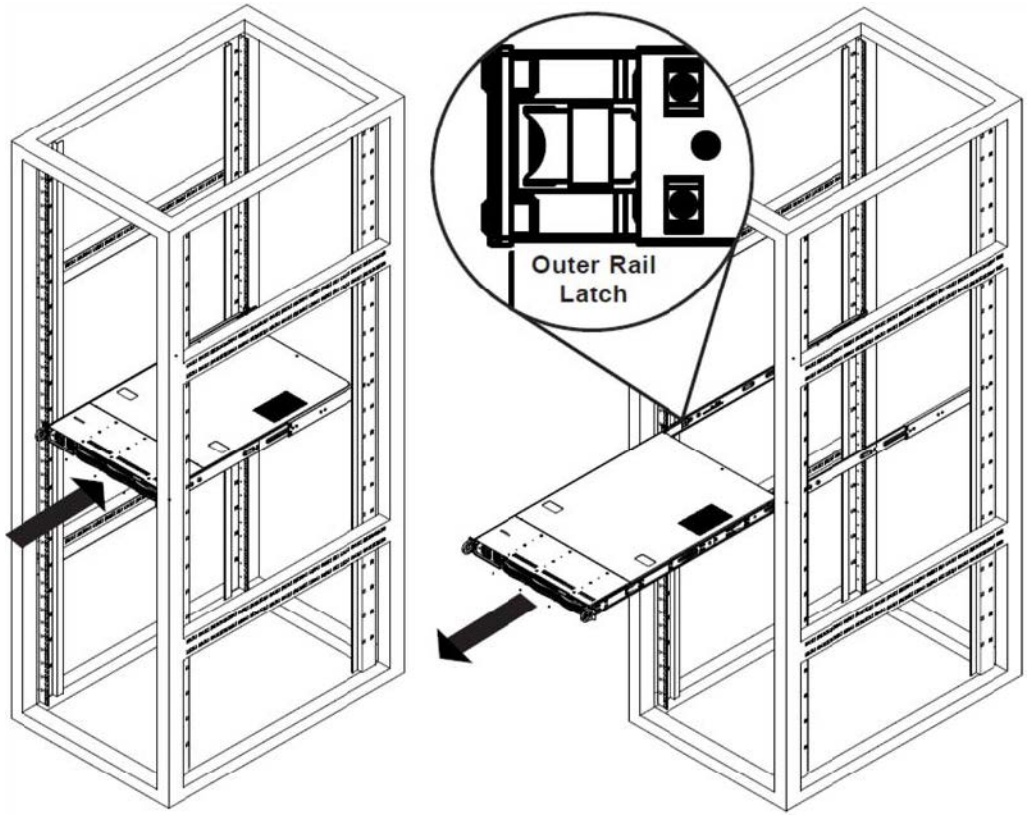
Installing the Server in the Rack

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

To install the server, follow these steps:

1. Slide the inner rail extensions forward into the front of the outer rails.
2. Support the chassis and align the back of the chassis with the front of the rails.
3. 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 to insert it securely in the rack before you remove support.



Removing the Server from the Rack

To remove the server from the rack, press the outer rail latch shown in the figure above to release the chassis.

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

Attaching the Bezel to the Chassis

To attach the bezel to the chassis, align the bezel's pigtails with the holes on the front plane and press it into place.

Making Data and Signal Connections

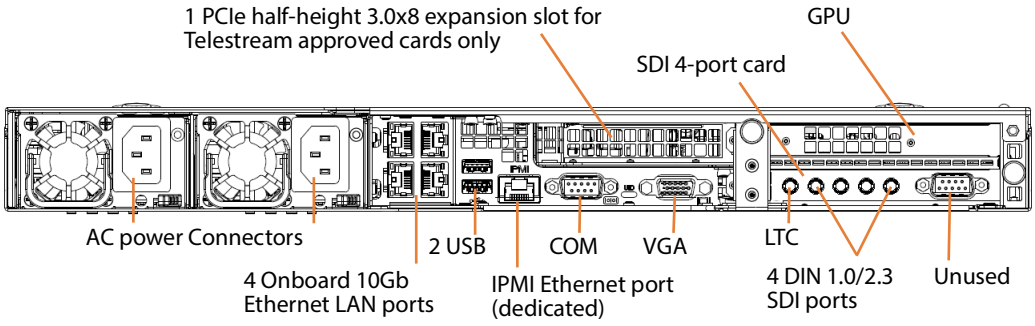
This topic describes the Lightspeed Live Server data and signal connectors and how to connect to them. Follow the order of connections given here, with the server powered down, make the following data and signal connections at the back of the server unit:

- Connect input devices (keyboard and mouse) to the USB connectors (optional).
- Connect a monitor to the VGA connector (optional).
- Make built-in Ethernet LAN connections to provide network connectivity.
- If a 25/100Gb Ethernet NIC is installed, connect to your 25/100Gb media LAN via SFP28 connectors.
- Connect your server to your IPMI network via the MGMT Ethernet port—Telestream strongly encourages using the IPMI interface to your management network for out-of-band management and troubleshooting.
- If your server has a Mellanox ConnectX card for ST 2110 media, connect two media LAN Ethernet / Fiber sources to the SFP/QSFP connectors.
- If your server is equipped with an SDI card, connect SDI video sources to the connectors on the SDI cards using the supplied DIN 1.0/2.3-to-BNC SDI cables.
- Optionally, on supported SDI cards, connect an analog LTC timecode source to the connector marked with LTC (rightmost) on the SDI card. This port is configured for Linear Timecode (LTC) encoded with SMPTE 12M timecode data.

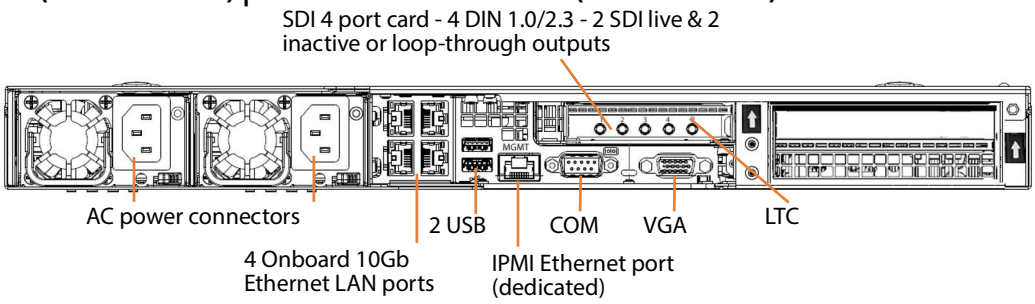
Note: This input is for analog LTC only and is not intended for use as a synch reference.

- Optionally, for C2+ | C4 (manufactured beginning October 2022) | C5 servers, connect a REF synch source to the connector marked with an R (leftmost) on the SDI card.
- Optionally, connect the *RS422 VTR Interface Kit* to a USB port. See *Connecting VTR Systems*.

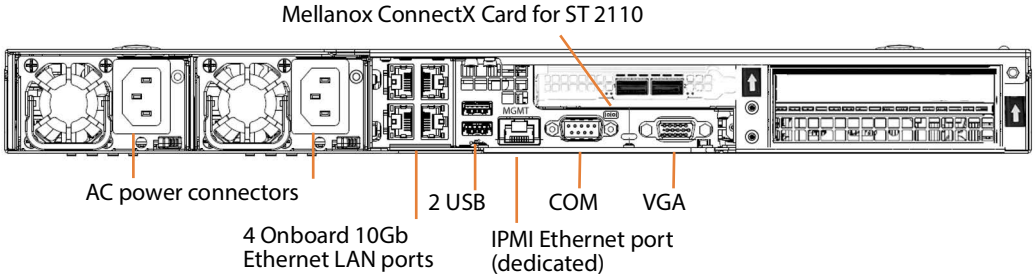
First-Generation (Gen 1) Rear Panel—4-Port Card (Discontinued)



C2 (Discontinued) | C2+ Rear Panel—2-Port (2 Deactivated) 3G SDI Card



C2+ Rear Panel—Mellanox ConnectX Card



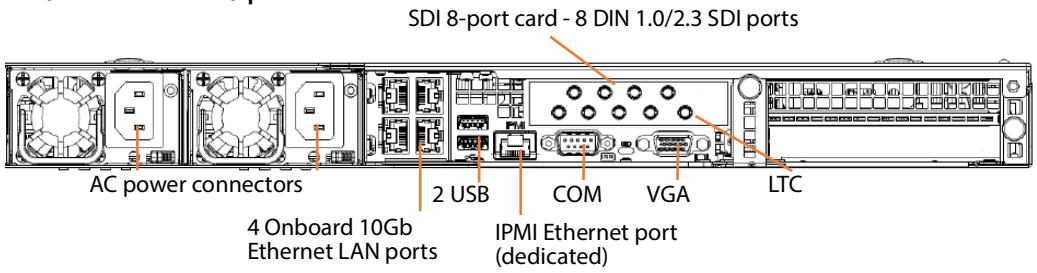
C2 | C2+ Video Card PCIe Bracket

Lightspeed Live Servers equipped with Corvid 44 and 88 3G cards manufactured beginning October 2022, have both LTC and Reference input ports on the Corvid card's backplane. Visually examine the card's PCIe bracket to verify that your server is so equipped:

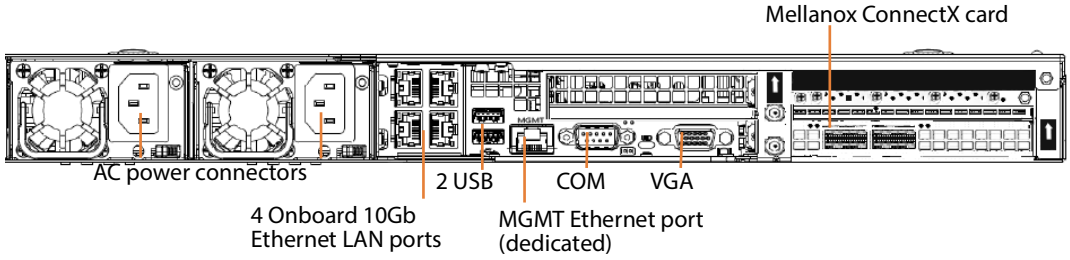
This enables you to use Reference input to sync SDI playout and to use the second port for LTC when in capture mode.

To utilize Reference in this manner, ensure that you have connected an analog LTC timecode source to the BNC connector marked with LTC, and you have connected a CB/TLS Synch source to the R (leftmost) port on the SDI card.

C3 (Discontinued) | C4 Rear Panel—8-Port 3G SDI Card



C4 Rear Panel—Mellanox Card



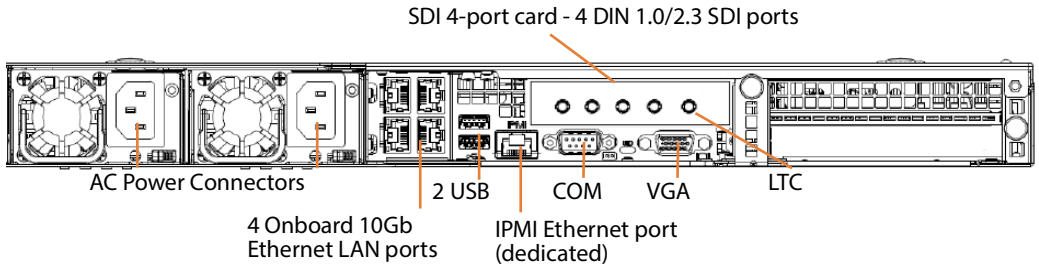
C4 Video Card PCIe Bracket

Lightspeed Live Servers equipped with Corvid 44 and 88 3G cards manufactured beginning October 2022, have both LTC and Reference input ports on the Corvid card's backplane. Visually examine the card's PCIe bracket to verify that your server is so equipped:

This enables you to use the standard Reference input to sync all of your SDI outputs and enables you to use the second port for LTC when in capture mode.

To utilize Reference in this manner, ensure that you have connected an analog LTC timecode source to the BNC connector marked with LTC, and you have connected a CB/TLS Synch source to the R (leftmost) port on the SDI card.

C4 Rear Panel—4-Port 12G SDI Card



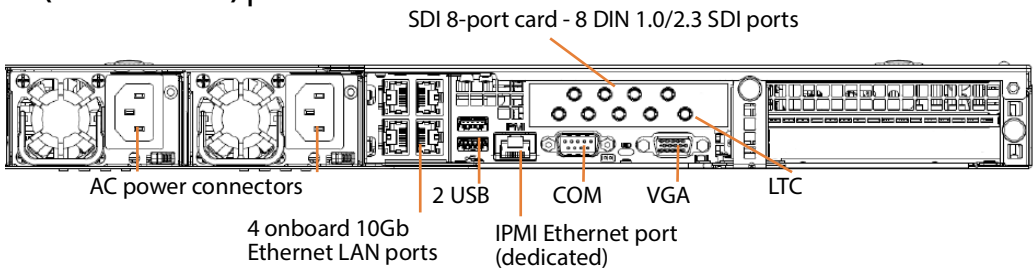
C4 Video Card PCIe Bracket

Lightspeed Live Servers equipped with Corvid 44 and 88 3G cards manufactured beginning October 2022, have both LTC and Reference input ports on the Corvid card's backplane. Visually examine the card's PCIe bracket to verify that your server is so equipped:

This enables you to use the standard Reference input to sync all of your SDI outputs and enables you to use the second port for LTC when in capture mode.

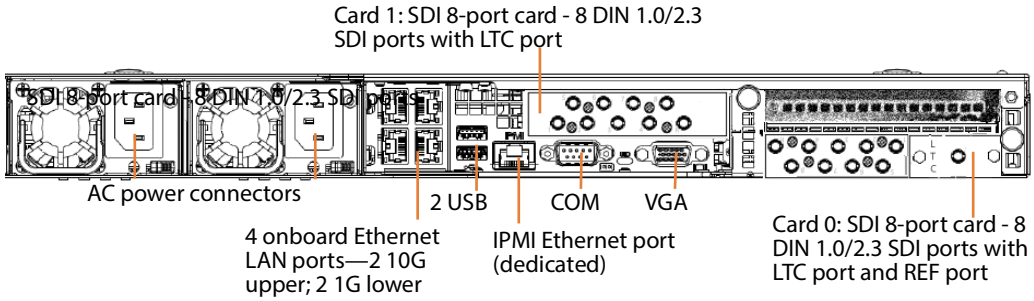
To utilize Reference in this manner, ensure that you have connected an analog LTC timecode source to the BNC connector marked with LTC, and you have connected a CB/TLS Synch source to the R (leftmost) port on the SDI card.

C3 (Discontinued) | C4 Rear Panel—8-Port 3G SDI Card



C5 Rear Panel—Dual 8-Port SDI Card Set

In this dual-card implementation, the half-height card in the center bay is referred to as card 1 in web apps; card 0 is the full-height card in the right-hand bay.



Power Requirements and Connections

After the server chassis has been physically installed in the rack and all data and signal 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.

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 these precautions when connecting power and operating the server:

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

Hazardous high voltage electricity is present on the backplane when the system is operating. To prevent possible injury or death, use caution when servicing.

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

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.

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

The fans might still be spinning when you remove the replaceable power supply from the chassis. Keep fingers, screwdrivers, and other objects away from openings in the housing.

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

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

Renaming a Lightspeed Live Server

Live Capture is a special implementation of Vantage, and the Vantage domain/array name is always the same as the host name of the server (or the server that hosts the Vantage domain database in an array).

When Windows is installed, it automatically names the computer with a random name, beginning with WIN- and a series of alphanumeric characters. For example: `WIN-S08Kh3N2EHG`. To rename your Lightspeed Live Server, complete these tasks to ensure that the Vantage database is also updated with the new name:

Note: The name must be 15 character or less.

To complete this procedure, your Windows user must have permission to rename the computer, or you must get assistance from your Windows administrator.

Be sure to schedule renaming during a maintenance window when no jobs are running, as renaming the Vantage domain interrupts all Vantage services in the domain (During a rename, Windows services on the server are automatically renamed as well).

To rename a Lightspeed Live Server, follow the steps outlined in the Vantage Domain Management Guide > Renaming a Vantage Domain.

Managing the Windows Operating System

Windows Server 2019 is installed on C2+, C4, and C5 Lightspeed Live Servers manufactured beginning February 2022. See *microsoft.com* for OS specifications.

Topics

Activating Windows with the Microsoft Activation Key

One or more stickers on the top surface of the Lightspeed Live Server lists license numbers. The Physical Key number is the OEM license number for Microsoft Windows. If you re-install the OS, use this key to activate Windows again. The key contains five groups of five digits each. For example: *YFG8H-TDD97-6BR4G-F88PF-XPF45J*.

Applying 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).

Default Windows User ID and Password

When the Lightspeed Live Server starts, log in with this Windows user account:

User	*Administrator*
Password	*telestream!1*

Your system administrator should change the password for security purposes.

Web App Ports and Windows Firewall Settings

The Lightspeed Live web applications use certain TCP ports that should not be blocked. These web apps use the following ports by default; some of which you can change:

- Live Capture—port 8083, 8084, and 8086.
  By default, selects any available port between 1024 and 65534 for the web app's Live Preview display.
- Tape Capture—port 8086
- Source Manager—port 8090

- Live Schedule Pro—port 443 and 6500
- RouteMaster—port 7777
- NDI Access Discovery—port 5960.

If you use Windows Firewall, be sure these ports are open on the Lightspeed Live Server and across your network.

Note: For a complete list of Vantage ports that are used and should not be blocked, see the Vantage Domain Management Guide > Port Requirements.

To open the Windows Firewall on the Lightspeed Live Server or other Windows computer, 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
- Source Manager
- Vantage Management Console | Vantage Workflow Designer | Vantage Workflow Portal (Capture only) \.

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

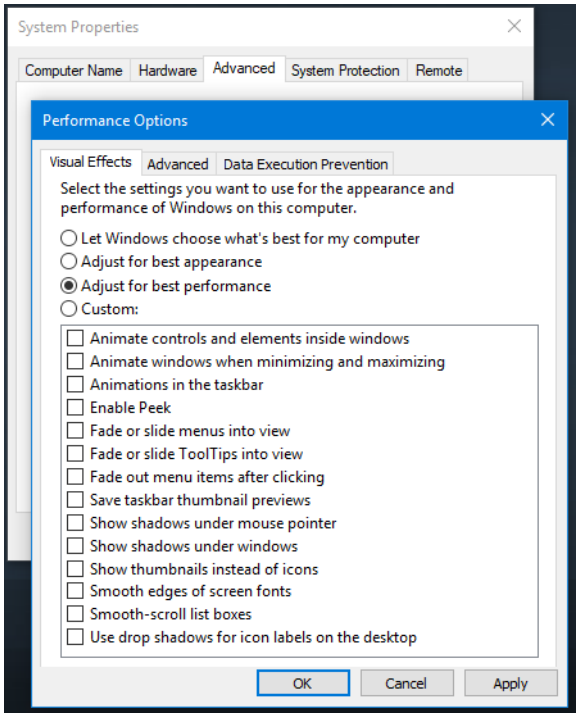
Maintaining a Lightspeed Live Server

These topics describes common server maintenance tasks that you may need to perform from time to time.

Performance Tuning a Lightspeed Live Server

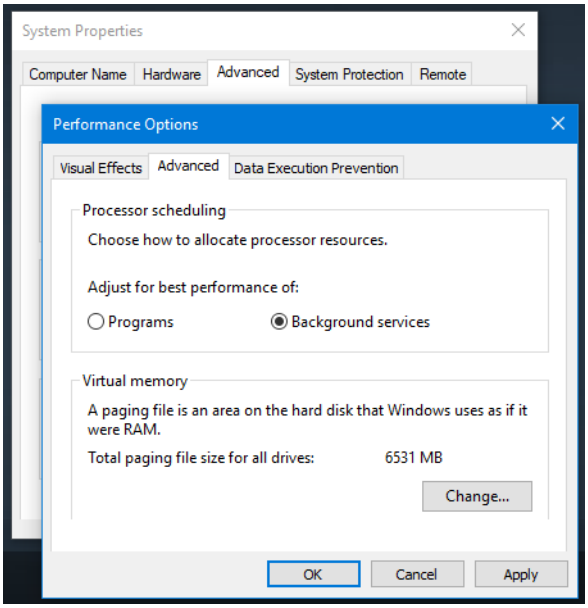
The following configurations are set at the factory to ensure best performance of your Lightspeed Live Server. The settings are supplied here in the event they have been changed and you want to restore them to their original factory settings. (For details, consult your System Administrator or a Telestream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

1. In Performance Options, set these Windows Performance options:
   a. Navigate to Start > Control Panel > System > Advanced system settings > Settings button > Visual Effects tab.
   b. Check *Adjust for best performance.*



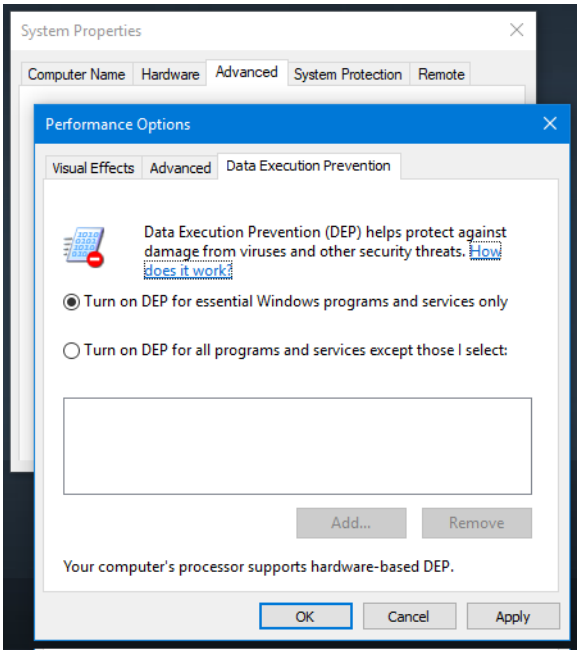
c. Select the Advanced tab.

d. Check Background services for Vantage transcoding service nodes and the domain's Microsoft SQL database node. Select Programs for editorial systems and Vantage client applications that are not running other Vantage services.



e. Select the Data Execution Prevention tab:

f. Check Turn on DEP (*Data Execution Prevention)* for essential Windows programs and services only.



g. Click OK in both dialogs to save your changes.

2. Set User Account Control (UAC):
   a. Navigate to Start > Control Panel > User Accounts > Change User Account Control Settings. Set as low as safely possible, considering your exposure to Internet viruses and malware. Click OK to save your changes.
3. Set Power Options to High Performance with Sleep disabled:
   a. Navigate to Start > Control Panel > Power Options.
   b. Check the High Performance plan.
   c. Check Change plan settings, and set Turn off the display to Never.
   d. Check Change advanced power settings, and set all critical functions so that they are always ON (this usually means setting them to *never* turn off). Click OK to save your changes and close the dialog.
   e. Click Save Changes on the Edit Plan Settings window.
4. 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.
5. Disable all unnecessary Windows services in Start > Control Panel > Administrative Tools > Services (consult your System Administrator).
6. Turn OFF all firewalls (including third party firewalls) and packet filtering, which may cause unpredictable performance:
   a. Navigate to Start > Control Panel > Windows Firewall > Turn Windows Firewall on or off, select Turn off Windows Firewall.

   If you choose to use firewalls, open them for the applications installed on the Lightspeed Live Server.
7. You may increase network throughput by increasing buffer size in your network adapter. Set your Network Adapter's transmit and receive buffers to 1024:
   a. Navigate to Start > Control Panel > Network and Sharing Center > Change Adapter Settings > Local Area Connection > Right-click and select Properties.
8. Disable any screen savers:
   a. Navigate to Start > Control Panel > Personalization > Screen Saver and select (None).
9. Disable disk indexing:
   a. Right click on Start and select Disk Management from the pop-up menu.
   b. Right-click each disk and select Properties.
   c. In the General tab uncheck Allow files on this drive to have contents indexed in addition to file properties, unless you want some drives to be indexed.

Setting Your NVIDIA GPU to TCC Mode

The NVIDIA GPU on Lightspeed Live Servers must run in TCC mode, as opposed to default WDDM mode: The NVIDIA GPU in TCC mode disables Windows graphics and is used in headless configurations, whereas WDDM mode is required for Windows graphics.

When you update the NVIDIA driver, you must reset it to TCC mode to operate properly.

You can run a script to set TCC mode. The bat script (*SetNvidiaDriverModelToTCC.bat*) is in the current version's folder.

Alternatively, perform the task manually—follow these steps:

1. Open a Command window and execute vnvidia-smi:

   ```
   cd C:\Windows\System32\
   nvidia-smi -q
   ```

2. nvidia-smi prints the NVSMI log.

   From the results, verify that the Driver Model indicates WDDM, not TCC. If TCC is reported, the mode is correct and you can end this task.
   Provided that WDDM is reported, locate and copy the GPU UUID—for example:

   ```
   GPU UUID: GPU-4951a582-6b45-cca6-5a1c-a647130d00b1
   ```

3. Change the GPU mode to TCC by executing this command:

   ```
   nvidia-smi -i GPU-4951a582-6b45-cca6-5a1c-a647130d00b1 -dm 1
   ```

   using the GPU UUID from the previous result.

4. When the driver mode changes to TCC, you'll be prompted to restart the server.

   If you're not prompted, determine the error and retry.

5. When the server restarts, run cmd.exe and execute this command again to verify that the NVIDIA GPU is operating in TCC mode:

   ```
   cd C:\Windows\System32\
   nvidia-smi -q
   ```

   Verify that TCC mode is set properly, as indicated in the Driver Model section of the log:

   ```
   Driver Model
        Current: TCC
        Pending: TCC
   ```

6. Close CMD and return to normal operations.

Backing up a 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.

Third-party disk image products are available (for example, Acronis and Clonezilla) for creating a restoration image that you can use to restore the Lightspeed Live Server's operating system drive to its original state. Using programs such as these, along with regular backups, you can restore your server back to its original shipping state with all of your critical data.

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

Managing and Monitoring Lightspeed Live Servers

IPMI View Management software provides remote network management of your Lightspeed Live Servers using IPMI messages over Ethernet LAN or a dedicated IPMI LAN. If all of the Ethernet connectors are utilized, you can use the IPMI LAN connector to create an IPMI network among your servers.

To download the IPMI View application and user guide, go to this web location: *supermicro.com/en/solutions/management-software/ipmi-utilities*.

Note: Various web apps are also published which can be used to perform network management and monitoring tasks.

To download the IPMI View application and user guide, go to this web location: *supermicro.com/en/solutions/management-software/ipmi-utilities*.

Tasks you can perform using IPMI View include (see IPMI View User's Guide for details):

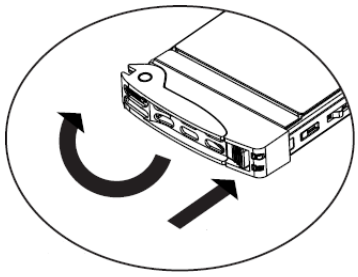
- Discover Lightspeed Live Servers on the IPMI network (requires IPMI LAN)
- View system event logs
- Check current sensors and monitor history of fans, voltages, temperature, and power supplies
- View firmware revision levels
- Perform various kinds of shutdowns and resets
- Blink the UID LED to locate 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*.

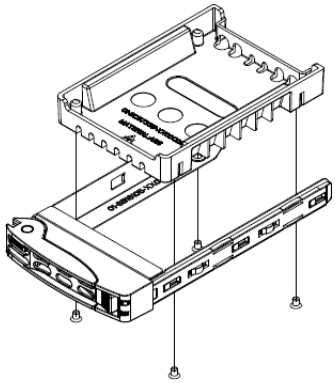
Installing New or Replacement Media Hard Drives

Follow these steps to replace a hard drive or install a new one. Drives may be removed or replaced with power on. See *Drives* 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 it seats firmly in the rear connector.
8. Push the handle closed flat against the front of the carrier to secure the drive.
9. Replace the front bezel on the chassis, and go to the next topic to rebuild the RAID.

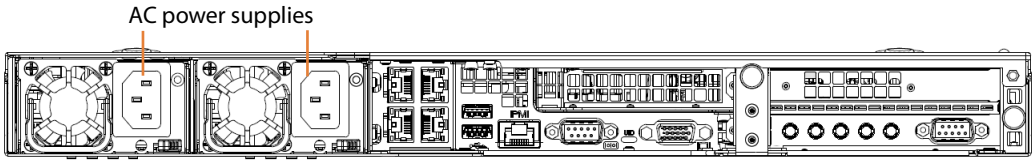
Rebuilding the Lightspeed Live Storage RAID

The LSI Storage Authority utility program—which you start from the shortcut or from *C:\Program Files\LSI\LSIStorageAuthority\startupLSAUI.bat* on the Lightspeed Live Server—enables you to rebuild the storage RAID if necessary, such as when you add a new drive, or you want to change drive configurations.

Replacing a Power Supply

The Lightspeed Live Server includes two user-replaceable, 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 supports the full load and allows the system to continue operation without interruption. The PWR Fail LED illuminates and remains on until the failed unit has been replaced. Replace with the same model. Order replacement units from Telestream. Contact Telestream Customer Support (*Obtaining Support | Information | Assistance*) to order parts.



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.

Setting NMOS Logging Levels

For Lightspeed Live Servers operating in an NMOS environment, you can set the Capture server's NMOS Receiver logging levels as desired. Follow these steps:

1. Open the *C:\Program Files\Telestream\Live Source Server\NmosNodeConfig.json* file in a text editor.
2. Change the logging level—the first line of the *NmosNodeConfig.json* file to an integer value between -40 (most verbose) and +40 (least verbose—only fatal messages). The default value is 0, which is a median level of verbosity.

   For example: `"logging_level" : 40,`
3. Save and close the file.

Managing Live Capture Logging

Live Capture's log files can provide valuable information about Live Capture operations, including the Capture action, Tape action, and capture and tape recording jobs.

Log files are intended for use by Telestream Customer Service to troubleshoot problems. Consider obtaining the log files before contacting Customer Service (*Obtaining Support | Information | Assistance*) so that you can email them to Telestream as part of the support process.

Topics

Accessing and Zipping Up Live Capture Log Files

By default, service logs are saved to *C:\Program Files (x86)\Telestream\Vantage\Live*.

If a service is run as a domain user, they saved to a user-specific path, in this pattern: *C:\Users\<Service_Account_Name>\AppData\Roaming\Telestream* where *<Service_Account_Name>* is the name of the domain user.

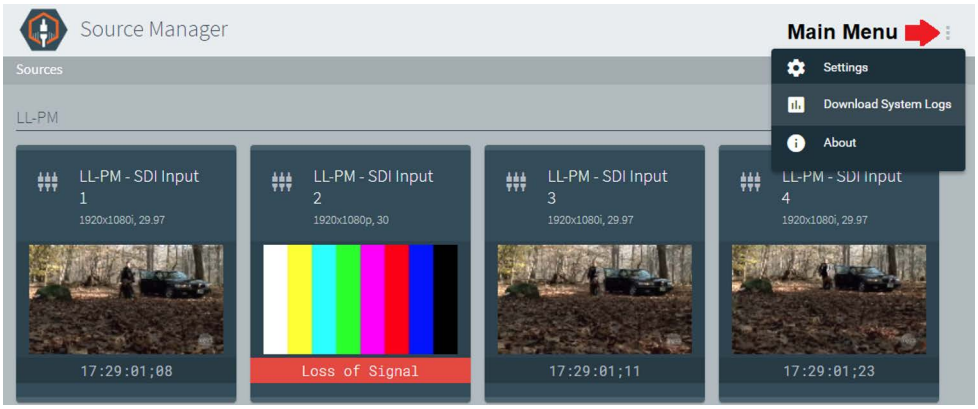
If a service is run as *Local System*, log files are stored in the service's Capture Component folder (there may be more than one). For example: *C:\Program Files (x86)\Telestream\Vantage\Components\Capture.7.1.5.999999)*.

Lightspeed live and tape capture log files on a job-by-job basis are written to *C:\Windows\System32\config\systemprofile\AppData\Roaming\Telestream\Capture*.

Zipping Up System Log Files

You can zip up and copy Live Capture system logs to your computer for archival purposes, for review, or in preparation for use in a customer service case.

To zip up log files, launch the Source Manager web app (http://[host]:8090/ (default)). In the More ⋮ Menu, select Download System Logs.



This creates a zip file on the Live Capture server and copies the zip file to your default *Downloads* directory (for example, *C:\Users\<UserID>\Downloads\support.zip*). The first file is named *support.zip*. The name includes a numeric suffix (*support (n).zip*) when multiple files are downloaded in the same folder.

When the file has downloaded, the file is displayed in a panel at the bottom of the browser window. Click the file's menu for options or click Show All (far right) to open the Downloads folder. Close the panel when done. You can open the zip file and examine the logs or forward the file to Telestream Support with a request for assistance.

Support Log Files

These log files are included in the zip file:

- Devices.csv
- EventLog-Application.evtx
- EventLog-System.evtx
- export.xml
- Processes.csv
- LiveRegistry.csv
- Services.csv
- SNMPLogs/
- Stats.txt
- versions.csv

SNMPLogs Folder

The SNMPLogs folder contains logging data from the Telestream Live Source Service:

- *SourceService-[date].log.txt*—Log records of activity with the sources. This includes loss of signal, change of format, sources being added, or sources being removed.
- *LiveService-[date].log.txt*—Log records of encoder failures and service startup, etc.
- packagingLog
- traceLog

SNMPLogs\traceLog Folder

The *SNMPLogs\traceLog* folder contains trace logs for the sources.

- [488]-LiveSource-<YYYY-MM-DD>-log.txt (where 488 is an example PID)
- SDI 1-LiveSource-<2023-04-28>-log.txt
- HalleyComet_TS-[7792]-ChannelEncode-2023-04-26-log.txt
- Slate-LiveSource-2023-05-15-log.txt
- SRT Source-LiveSource-2022-11-21-log.txt

Managing Log File Logging Levels

You can change the level of detail (and volume) of information written to log files by editing settings in the configuration files.

Accessing Logging Configuration Files

Logging is implemented using NLog version 4.7. For details about using NLog to configure log file parameters, refer to https://github.com/NLog/NLog/wiki/.

Live and Tape Capture Jobs

These configuration files are in the Live Capture ComponentPac folder that supports Capture and Tape action recording, and the Push action (there may be more than one ComponentPac installed). The configuration files for logging live capture and tape recording processes are:

- *C:\Program Files (x86)\Telestream\Vantage\Components\Capture.<Version>\CaptureRecord.exe.config*—specifies the live capture process logging levels.
- *C:\Program Files (x86)\Telestream\Vantage\Components\Capture.<Version>\TapeRecord.exe.config*—specifies the tape process logging levels.
- *C:\Program Files (x86)\Telestream\Vantage\Components\Capture.<Version>\TapeStitch.exe.config*—specifies the tape process logging levels when the Vantage Tape action is configured with the Stitch Clips control enabled, where multiple tapes are used in a single job.
- *C:\Program Files (x86)\Telestream\Vantage\Components\Capture.<Version>\CaptureRecord.exe.config*—specifies the live capture process logging levels.
- *C:\Program Files (x86)\Telestream\Vantage\Components\Capture.<Version>\CapturePush.exe.config*—specifies the tape process logging levels.

Note: The Vantage Live Service does not utilize NLog.

There is usually no requirement to modify this configuration file, except under guidance of a Telestream support engineer.

Live Preview in Source Manager

The configuration file for logging the Live Preview process, which displays video in Source Manager, is:

- *LivePreview.exe.config—C:\Program Files\Telestream\Live Source Server\LivePreview.exe.config*.

Telestream Live Source Service

The configuration file for logging the Live Source process is:

- *LiveSource.exe.config—C:\Program Files\Telestream\Live Source Server\LiveSource.exe.config*.

By default, LiveSource process logs don't contain the source PID in the name.

If you want the Live Source Service to create a new log files each time a new PID is used for source when a source process restarts, modify the Live Source configuration file as shown here.

Change...

<variable name="LogSuffix" value="-LiveSource-${date:format=yyyy-MM-dd}-log.txt" />
to
<variable name="LogSuffix" value="-LiveSource[${processId}]-${date:format=yyyy-MM-dd}-log.txt" />.

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

Note: After you make changes to the configuration file, you should restart the services to apply the change.

Configuring Vantage and Updating Live Capture

Live Capture requires Capture workflows in Vantage to serialize incoming live SDI and IP sources, encoding them into files. You'll need to configure Vantage to inter-operate with Live Capture, and to create workflows that execute under control of Live Capture. You'll also need to know how to use labels and variables between systems, and deal with network complexity including firewalls, UNC paths, and scaling Capture systems.

Note: Before you start using Live Capture, specific configuration is required. The *Up and Running Checklist* describes the initial configuration tasks.
If you aren't familiar with Vantage, browse the Vantage User Guide directly in Vantage Workflow Designer and the Vantage Domain Management Guide in the Vantage Console. Configuration details about Live Capture actions are provided directly in each action's inspector, including detailed information about containers and codecs.

Topics

Overview

Configuring Vantage for use with Live Capture includes setting up certain features and creating Vantage Capture/Tape workflows to capture media and save it as a file. These one-time configuration tasks are required in your Vantage domain before you can use Live Capture.

The program used to perform configuration tasks is the Vantage Management Console, which typically has an icon on the desktop of the Vantage server or other computer utilized with Vantage (a *node*, in Vantage parlance). Later in this chapter you'll learn how to use the console to perform the tasks.

Workflows are designed and managed using another Vantage program—Vantage Workflow Designer—which is also launched from a desktop icon. We will guide you step by step in creating and activating a simple Live Capture workflow that detects your sources, encodes them, and places your captured files into a storage location.

Once a Live Capture workflow is activated, you're ready to start capturing. Capture control is manually performed using the Live Capture web application. User-written programs utilizing the Live Capture API can also be used to control capture operations.

Up and Running Checklist

Each Lightspeed Live Server is delivered with Live Capture and the Vantage Media Processing Platform (often referred to simply as *Vantage* in this guide) installed.

This checklist includes all of the configuration tasks you should complete to get your Live Capture system up and running on premises, whether you perform the work yourself or a Telestream Customer Service representative or Field Engineer performs the work for you. (Follow the links to the how-to topics for step-by-step instructions.)

Installing your Server...

Install and Connect your Live Capture Server—First, install your Lightspeed Live Server in a rack, make all physical connections, and add it to your Windows domain. See *Installing & Managing Your Lightspeed Live Server*.

Or, install Live Capture on your VM | cloud platform.

Note: Do not perform the remaining tasks in this checklist until you have installed your Live Capture Server. For support, see *Obtaining Support | Information | Assistance*.

In the Vantage Management Console...

Note: To learn how to perform any of these tasks, display the panel you want to use and click the question mark (?) button in the upper right corner of the console to display the topic in the *Vantage Domain Management Guide*.

Note: To launch the Vantage Management Console, you can use the desktop icon.

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1. **Add Your Capture License to Vantage**—Choose Licenses (in the left panel) to display the Licenses tab and add the Capture license to the Vantage domain, which is located on the desktop in the License folder.
2. **Restart Vantage Client Programs**—Restart the Management Console, and any other Vantage programs that may be running.
3. **Enable User Administration**—Configure Vantage for user management:
   a. Choose Settings & Options in the left panel. On the General tab, check Enable user administration to enable it (required).
   b. Check Use Windows Active Directory for Users to add and maintain Vantage users from your network's Active Directory instead of creating them manually in Vantage. (The server must part of a domain—if its in a Windows workgroup, this feature is unavailable).
4. **Enable Open Workflows**—Also in the General Tab, check Enable Open Workflows. Open Workflows enables serial actions in a workflow processing the growing output of a Capture or Tape action concurrently, reducing total workflow time.

Note: Open Workflows is an optional, licensed feature, which you can enable in your Vantage domain. If your Live Capture system is joined to a Vantage domain, all Open-capable actions in Capture and Tape workflows (those utilizing Capture or Tape actions) can operate in open mode, regardless of whether Vantage is specifically licensed to support open workflows or not.

5. **Create User Accounts**—Each user may optionally have their own Vantage user account; it is not a requirement.

Note: User accounts can also be used to control access to the Management Console, Workflow Designer, Workflow Categories, and Channel Groups. Or, they can prevent users from competing for the same resources.

6. **Configure Service Logons**—By default, all Vantage and Telestream services are configured to use the *Local System* account. This account only provides access to files on the local Vantage domain server.
   If Vantage requires access to input or output folders on other servers (which is likely), you should create a user account for Vantage in your Windows domain, and grant access to the Vantage user account on the target server. All services must use the same account. Attempting to run them in different accounts results in failures.

   You can configure Vantage services to log on with specific accounts in the Vantage Management Console or in Windows via the Services MSC.

   Telestream services must be updated directly via the Services MSC, because it is not a Vantage service; thus, its not listed in the Management Console.

Note: For a full discussion of Windows authentication and service user account requirements, see the Vantage Domain Management Guide as well as these Vantage Installation Guide topics: Windows Authentication Guidelines and Setting the Vantage Windows Log On ID for Services.

   During workflow creation, you also must specify Open Workflows at both the workflow and the action level:

- **Workflow Level**— In Workflow Designer's workflow details panel above the action selector panel, check the Open Mode option.
- **Action Level**—On each action, right-click and choose *Workflow Mode* > *Open*.

7. **Create a Vantage Live Store**—Live Capture requires at least one Live Store and one File Store. Choose Storage > Vantage Stores to create at least one Vantage Store (Live). Create a Live Store on the Vantage server's local D drive in a Windows folder you choose or create: See *Using Live Stores for Capturing Files* for a detailed discussion and configuration details.
8. **Create a Vantage File Store**—One default store is present in Vantage. Choose Storage > Vantage Stores to more Vantage Stores if required.

9. **Create Network Folders | Vantage Folders**—This is optional, based on your workflow requirements for network server file access.
   a. **Network Folders**—If you plan to access network servers for input or output files, create/identify each location. The location should be capable of the I/O required for sustained reading/writing of live media. This may be a folder on the Lightspeed Live Server's D drive (media drive) or a NAS/SAN. In the Capture and Tape web apps, you can direct the Primary and Secondary outputs to one of these Vantage Address Book folders.
   b. **Vantage Folders**—Now, create Vantage folder address records in the Vantage Address Book to identify locations by name—Vantage Folders make it easy to specify the location during workflow design. Select Storage > Vantage Folder Address Book and add Vantage Folders.

Note: Telestream recommends that you create one Vantage Folder initially; you can create others as required for your workflows.

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10. **Authorizations**—Optional; if Windows credentials are required for Vantage services when they access network locations in another Windows domain or workgroup, create Authorization records for the services to use as necessary: Click Settings & Options, display the Authorization tab and create authorization records.
11. **Create a Channel Group's Nexus**—Vantage uses the concept of a *nexus* generally, to organize and identify related resources and enable client applications to filter them. In the context of Live Capture, these resources are Vantage workflows. When you create a Live Capture workflow, you can associate it with a specific Channel Group. There is a unique nexus for each capture action—Capture and Tape.

    In Capture web apps, you select one of your channel groups to display only those Vantage workflows in this group. Next, you choose a workflow in the channel group to use for the task you're currently performing.

    At least one nexus is required. The type of nexus you create depends on the web apps you plan to use.

    Open Workflow Design Items > Nexus Definitions in the left panel to display the Nexus Definitions panel and create at least one Channel Group nexus:

    – Live Capture workflows (using a Capture origin action) require a Capture nexus and jobs are submitted (capture operations are started) directly from the Capture web app.
    – Tape Capture workflows (using a Tape Capture origin action) require a Tape Capture nexus and jobs are submitted (capture operations are started) directly from the Tape Capture web app.

    For testing, create a nexus named *Capture Nexus*.
12. **Restart the Vantage Live Service**—To apply these settings for use in Capture, restart the Vantage Live Service: Display the Services tab and choose Live. Place it in maintenance mode (click the yellow down arrow in the toolbar) and then return it to Online, by clicking the green arrow.

In Source Manager...

Open the Chrome program and perform these configuration steps on each Live Capture server:

1. Start the Source Manager web app (*http://localhost* | `<Remote Host Server Name>`*:8090*).
2. Rename the SDI sources if required, then configure them (for details, see *Configuring SDI Sources*).
3. Create and configure IP sources if any are required. See relevant topics.
4. Create and configure ST 2110 sources if any are required—see *Creating and Configuring ST 2110 Sources*.

In Vantage Workflow Designer...

You should create and configure at least one workflow for each Live Capture application you plan to implement (Live Capture | Tape Capture).

Note: Only one Tape or Capture action is allowed in a Live Capture workflow. Multiple Tape/Capture actions in a single workflow is not supported.

For testing purposes, create a Live Capture workflow and configure it as described here. The simplest workflow has a single Capture action and uses a manual trigger, in order to activate a recording from the Live Capture Web App.

1. Create a new workflow, named *Live Capture Test*.
2. Add a Capture action from the Live category.
3. Open the Inspector and configure the following:

- Source: Select any live source you have connected to the Capture server.
- Channel Group: Capture Nexus (created earlier).
- Trigger: Manual
- Primary Output: QuickTime
- Nickname: Original
- Output Location: Vantage Store > LiveStore (created earlier).

4. Save and close the inspector.
5. Activate your workflow so that you can utilize it in Live Capture. In the Monitor Status tab, the Live Capture workflow you've activated should be listed, and state should indicate *In Process*.

See *Creating Vantage Capture Workflows for Live and Tape Media* for prototype workflows.

In Live Capture...

Now, you're ready to test the system... follow these steps:

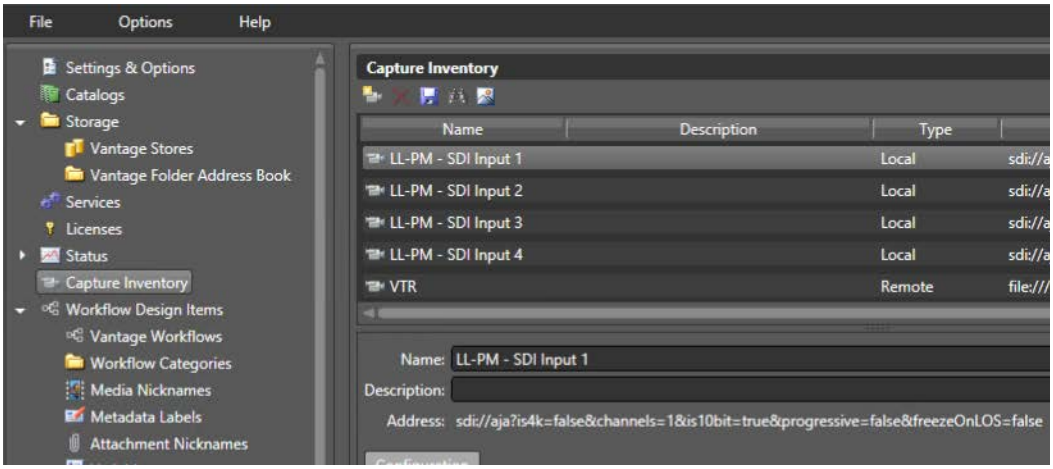
1. Open Chrome and go to *http://localhost* | `<Remote Host Server Name>`*/Vantage*.
2. Locate your target Vantage domain, enter the default user ID *Administrator* (no password) to log in.
3. In the Vantage web portal, open the Live Capture web app.
4. Select your nexus.
5. Click Live Capture and note that there is an active channel for the workflow that you activated.
6. Begin capturing video. The active feeds display a preview thumbnail in the Channels panel of the Live Capture web app (*http://localhost/Vantage/LiveCapture.../channels/*). You can activate Live Capture workflows configured with a manual trigger or a recurring segment trigger directly from this window.

Previewing Sources and Finding Workflows

The Capture Inventory panel in the Vantage Management Console (VMC) enables you to display a preview of a Capture source, and to identify workflows which are configured to use a particular source. All SDI sources on a Lightspeed Live Server are automatically added to the Capture inventory list.

Note: Source configuration is performed using Live Source Manager (see *Managing Video Sources*).

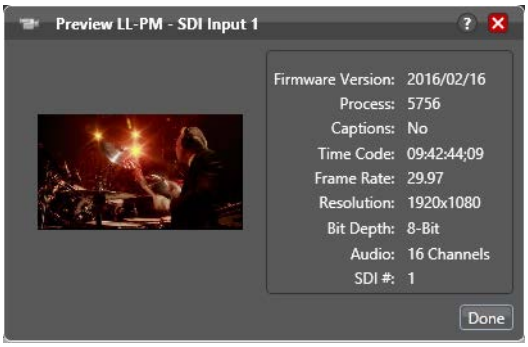
Select Capture Inventory in the left panel to display the Capture Inventory panel:



Note: If all input sources are not displayed after installing and starting Live Capture, restart the Live Capture Server. Then, check the Capture Inventory panel again for the list of sources. The list should be populated with *all* input sources after all Live Capture servers have been restarted.

Previewing Sources

To preview a source thumbnail and details, click the Preview button in the Capture Inventory toolbar. The preview image is updated once per second.



Finding Workflows

To determine which workflows are configured to use a specific source, click the Find Workflows button in the Capture Inventory toolbar.

The console displays a list of associated workflows:

Using Live Stores for Capturing Files

The Capture action requires a Live Store for capturing files.

Note: If you use other Vantage encoders in your Capture workflows, including Flip Pro or Media Creation, they require a file store. See *Creating Stores in Vantage* and *Creating Stores, Using a UNC Path* below, for implementation details.

You use a Vantage Live Store as a managed output location for Primary and Secondary Capture output. *Live* stores in Vantage are only used by Capture workflows, and are the only type of store that you can use in Capture | Tape workflows.

WARNING: To ensure that Vantage Live Stores manage captured media in real time—including deleting expired media in a timely manner by deleting files to preserve disk space—it is very important that Live Stores are configured correctly. Failure to do so may result in running out of disk space and failure of Capture workflows in real time.

Live Stores in Vantage refer to locations that automatically recycle expired media to preserve disk space in real time, improving overall system efficiency.

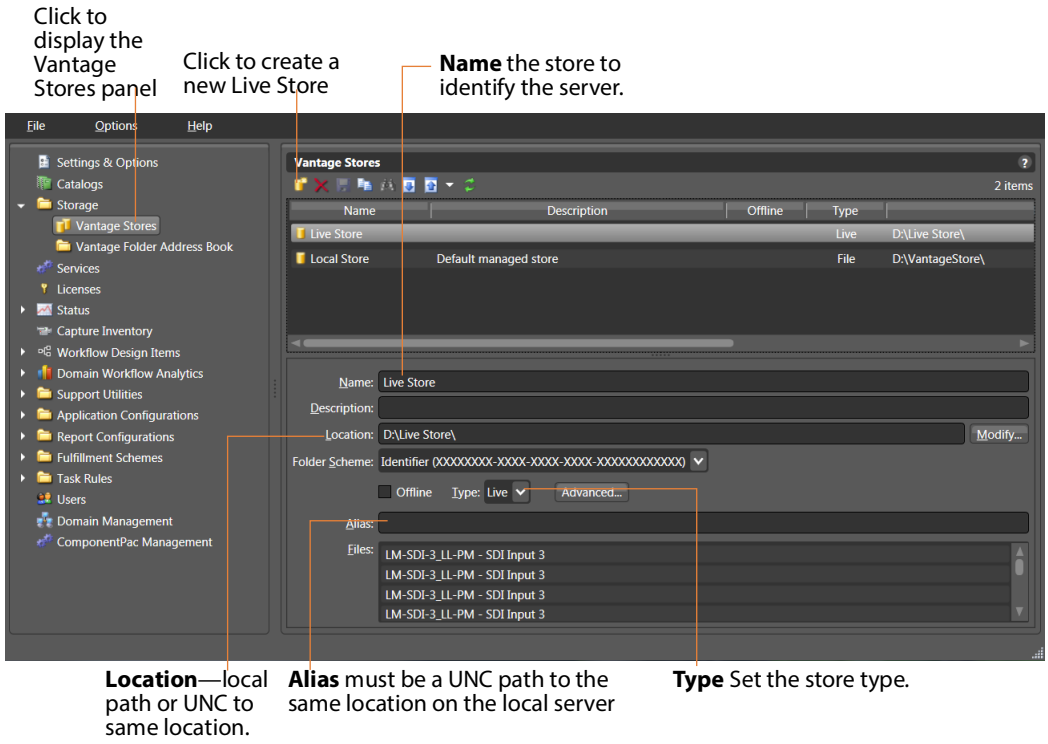
Note: This is a practical overview of using Live Stores from the Capture perspective. The creation, configuration, and management of stores, including as shares, is described in the Vantage Domain Management Guide. See the Vantage Domain Management Guide > Managing the Vantage Domain.

Each Live Store identifies a specific server and directory path (folder). Live Stores should be created on a Capture server's D drive or on a server with the I/O capacity to support real-time write operations for best efficiency and overall system effectiveness. You can also create Live Stores on NAS or SAN storage systems.

Note: For Network Attached Storage systems (NAS), the cardinal rule is to always create stores using UNC paths when you have a Capture array.

Creating Stores in Vantage

You create and manage Vantage Stores using the Vantage Management Console:



Creating a Live Store Folder

To create a folder for the Live Store, perform these tasks:

1. On each Live Capture server, In Windows Explorer, navigate to the D drive and create a local path and folder for this store. Name it *LiveStore*, for example. Alternatively, use a SAN/NAS.
2. In Windows Explorer, select the *LiveStore* folder you just created and update the folder's properties:
   - **a.** Share the folder (this enables you to add aliases as well)
   - **b.** Add authorized users—your Vantage and Telestream Services users
   - **c.** Set read/write privileges
   - **d.** Set security permissions as appropriate.

Note: In an array, the location must be a local driver letter or UNC network path and the Alias must be a UNC path to the same location or recycling is rendered inoperative. Otherwise, the Capture action must be configured with Run On rules to ensure that the local drive is always used on each Capture server in the array.

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3. Make certain that Vantage and Telestream services are using appropriate Windows user accounts for accessing network locations—see *Up and Running Checklist*, Step 4.

Creating a File Store Folder

To create a folder for a File Store, perform these tasks:

1. On each Live Capture server, In Windows Explorer, navigate to the D drive and create a local path and folder for this store. Name it *FileStore*, for example. Alternatively, use a SAN/NAS.
2. In Windows Explorer, select the *FileStore* folder you just created and update the folder's properties:
   a. Share the folder (this enables you to add aliases as well)
   b. Add authorized users—your Vantage and Telestream Services users
   c. Set read/write privileges
   d. Set security permissions as appropriate.

Note: In an array, the location must be a local driver letter or UNC network path and the Alias must be a UNC path to the same location or recycling is rendered inoperative. Otherwise, the Capture action must be configured with Run On rules to ensure that the local drive is always used on each Capture server in the array.

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3. Make certain that Vantage and Telestream services are using appropriate Windows user accounts for accessing network locations—see *Up and Running Checklist*, Step 4.

Creating Stores, Using a UNC Path

To ensure that stores are accessible to Vantage and Telestream services hosted on a multi-server array, specify the location as a drive letter or UNC path, whether they are local or on a SAN/NAS. A UNC path is also required when you are using the Capture web apps hosted on an IIS server other than the Capture server.

Follow these steps to create and configure a Live or File Store:

1. Share the D drive in Windows.
2. Choose Storage > Vantage Stores in the left panel. The Vantage Stores panel lists all of the stores (two types—File and Live) in the Vantage domain. Click the New Vantage Store icon and specify the Location and Alias. Be sure to select Type: Live for your Live Stores, and File for your File Stores. For configuration details, display the Help topic (?) in the Management Console.

   For example, for Capture servers LSL-01, LSL-02, and LSL-03, create these stores:

Live Store Name	Location	Store Type	Alias
LSL-01 Local Live Store	D:\LiveStore	Live	\\LSL-01\d\livestore
LSL-02 Local Live Store	D:\LiveStore	Live	\\LSL-02\d\livestore
LSL-03 Local Live Store	D:\LiveStore	Live	\\LSL-03\d\livestore

1. In the Alias field, add a UNC path (NOT a drive letter) pointing to the same path as specified in Location.
2. Create authorization records in the Vantage Management Console > Settings and Options > Authorization tab for each Live Store UNC path. Then put all Vantage services into Maintenance Mode and exit them again to apply the change.
3. When creating workflows, be sure to assign Capture actions to the Live Store corresponding to the Capture server where the action is executing. For example, assign Capture actions on *LSL-01* to the *LSL-01 Live Store (\\LSL-01\d\livestore)*.

Executing Transport Actions Using Local & UNC Paths

If a Live Store is only defined as a local path, then the Vantage Transport Service (which executes Transport actions) executing Copy or Move actions in a workflow must also run locally—on the same server as the Vantage Live Service, which executes the Capture, Tape, and Push actions. While they may not be necessary, Run On rules are often added to make sure that Transport actions always execute locally.

However, if a Live Store also specifies a UNC path that is accessible to all servers in a Vantage domain, then the Vantage Transport Service may run on any server in the array, assuming the domain is configured to use the Transport service authorized access to the UNC path. Details are presented in the Vantage Domain Management Guide.

Managing Live Storage Disk Space

Capture systems can consume significant disk space during operation. In order to maintain adequate disk space, Vantage enables you to manage Live Capture server storage automatically and manually.

In typical usage, Vantage's job expiration is an automatic, continual means of controlling storage space. In addition, Vantage enables you to manually delete files from Live Capture server managed storage, via the Vantage Management Console. This is particularly useful when your Lightspeed servers are mobile—being shut down between capture events—for transport.

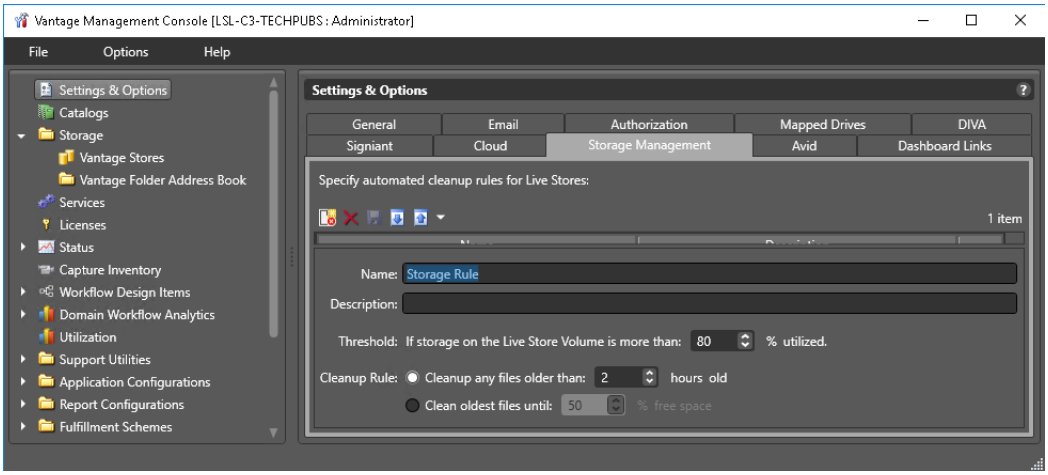
For example, when a live music concert/event is performed, Live Capture is set up and started immediately prior to the start of the event, when recording begins. Then, after a two or three hour event, the Capture system is shut down and repacked for transport.

This shutdown may result in multiple channels of 2-3 hours of recording on disk. Because the Capture system was shut down for shipment shortly after capture was complete, there was no time for the expiration rules to clean up storage.

Rule-based Space Management

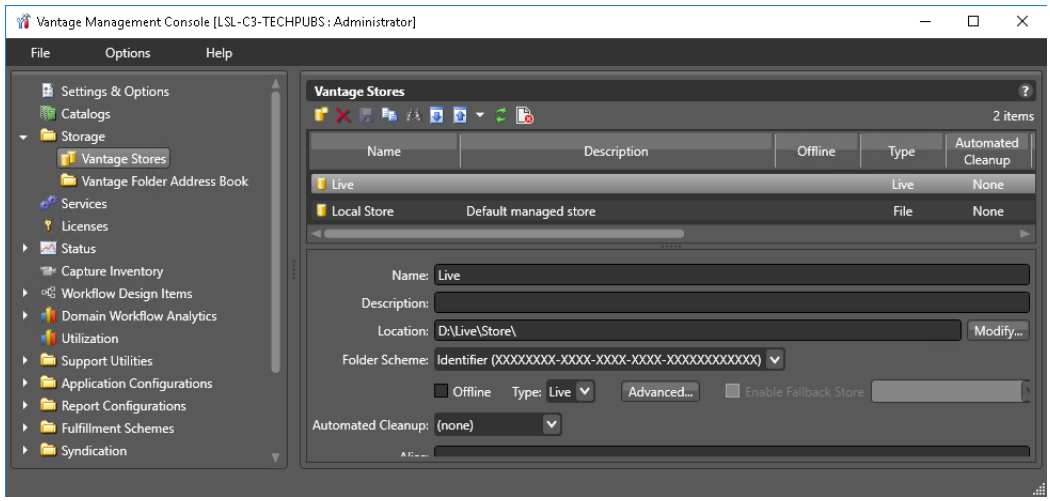
You can set up parameters to govern automated file deletion on selected Live Stores.

In the Vantage Management Console, display Settings & Options > Storage Management tab to create file deletion rules:



For configuration guidance, click the **?** button to display the Vantage Management Guide.

Next, in Storage > Vantage Stores, select a store, and specify the rule that applies using the Automated Cleanup menu:



For configuration guidance, click the **?** button to display the Vantage Management Guide.

Workflow and Job-based Space Management

Workflow and job-based storage space management enables you to configure your workflows so that Vantage continually monitors jobs by age, and delete their associated files.

You can set up the following automatic space reclamation options:

- *Workflow Expiration*—in Workflow Designer, enable this setting for your workflow in its settings panel) (see Viewing and Specifying Workflow Details in the Workflow Designer User's Guide) to automatically delete files ingested or created by the job, as part of the binder deletion process.
- *Expire Failed Jobs*—in the Vantage Management Console Settings & Options > General panel (see Enabling and Disabling Expiration of Failed Jobs in the Domain Management Guide), enable the Expire Failed Jobs setting when you want failed jobs to be expired using the same expiration rules as jobs that complete successfully. Otherwise, they do not expire automatically, and binders (and file resources) are preserved until deleted manually.

Manual Space Management

You may need to override the automatic space management settings on occasion, and perform manual cleanup.

Using the Vantage Management Console, you can manually delete files at any time. You can delete all files in Live Stores, and you can also delete Live Store files by age and by percent of free space.

Manual deletion is achieved using either of these options (Storage > Vantage Stores—right click on the target store and select Storage Cleanup or Quick Cleanup>

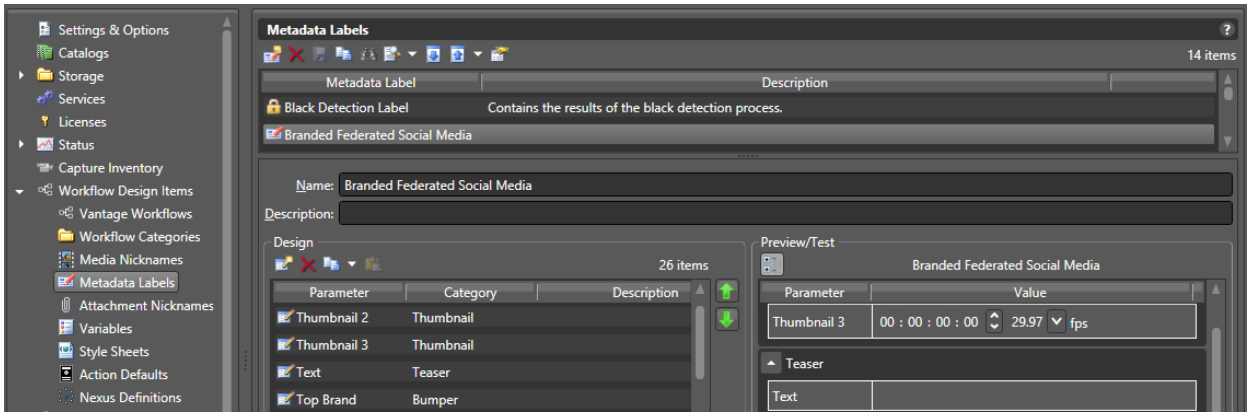
- *Storage Cleanup*—immediately deletes all files in selected stores (Quick Cleanup for multiple stores) or Advanced Cleanup by date or by percent of free store space.
- *Quick Cleanup*—immediately deletes all files in the target store. Click OK to continue.

Creating Labels and Variables for Use in Workflows

You can add labels and variables to the Tape action and Capture action and you can view and update their values in the Tape Capture, Live Capture, and Live Schedule Pro web applications.

Labels and variables are created and managed in Vantage. After creating a label or variable, you can use them in your workflows as required. For more details, click the ? icon or display the User's Guide from the Help menu.

This graphic displays the Metadata Labels panel in the Vantage Management Console where you create and update them.



In the console, add labels using Workflow Design Items > Metadata Labels. You can also add variables in Vantage Workflow Designer: select Items > Variables.

Updating Vantage and External Systems with Variables

You can attach one or more variables to an event, and then, on a job-by-job basis, provide unique values for the variable. In the Vantage workflow, you can also save the variables as part of a label, along with the other workflow output in a catalog, for use in other workflows or for use externally, in other systems.

Or, you can create a workflow to update metadata in external systems using variables. For example, you can modify your Capture workflow to enable the Update Workflow and provide a target workflow to trigger after each job. Now, create the target workflow with a Receive action (so it can be triggered) and then use Populate and Notify actions for example, to transfer new values to an external system.

Updating Vantage and External Systems with Metadata

You can attach one or more labels to an event, and then, on a job-by-job basis, provide unique values for the fields in the label. In the Vantage workflow, you can also save the label along with the other workflow output in a catalog, for use in other workflows or for use externally, in other systems.

Or, you can create a workflow to update metadata in external systems using variables. For example, you can modify your Capture workflow to enable the Update Workflow and provide a target workflow to trigger after each job. Now, create the target workflow with a Receive action (so it can be triggered) and then use Populate and Notify actions for example, to transfer new values to an external system.

Updating Live Capture Software

You should only update Live Capture when you are directed to do so, as instructed by periodic Telestream service bulletins. You can download the Live Capture installer from Telestream's support web site (see *Obtaining Support | Information | Assistance*).

Updating Live Capture Web Apps on Windows Workstations

To install/update Live Capture web apps on a Windows computer (other than Live Capture servers), IIS is required. If IIS is already installed, you must create a configuration that supports Vantage Web Applications.

See *Installing and Configuring Vantage Web Applications* in the *Vantage Installation Guide* or the *Domain Management Guide* for details. An easy way to access the *Domain Management Guide* is to open the Vantage Management Console and click the ? in the upper right corner of the main window.

The following helpful topics are in the *Vantage Installation Guide* and the *Domain Management Guide:*

- *Server Hardware Requirements*
- *Vantage Web Applications OS*

Note: Log into the Telestream Live Capture Support Portal and download the Live Capture installer before proceeding with these tasks to update Live Capture.

Note: After installing a Vantage or Live Capture ComponentPac update, clear the browsing data in your browser in order for web applications to operate properly. See *Clearing Browsing Data after Updating Vantage or Live Capture* for detailed information.

Follow these steps to install or update Live Capture web apps:

1. Copy the installer directly to the target computer or place it on a network server that you can access from the target computer.
2. On systems running Live Schedule, you must uninstall Live Schedule before uninstalling Vantage Web Applications. This is required—if you don't, Live Schedule will not function after the update.
3. Uninstall the current Vantage Web Applications using the Windows Apps & Features Control Panel.
4. Run the Live Capture Installer and select the Vantage Web Applications Setup installer and proceed according to the installer directions.

Updating Live Capture

Use these topics to update Live Capture to the current version on your Lightspeed Live Server or install it or update it on other supported platforms.

Note: Log into the Telestream Live Capture Support Portal and download the Live Capture installer before proceeding with these tasks to update Live Capture.

All of the required files for each release are in the ~*Installer* folder, located in their respective folders:

- *\AJA Drivers and Firmware*
- *\Live Capture Installer*
- *\Nvidia\Drivers and Firmware*
- *\USB-Serial Drivers*
- *\Vantage Updates*

Updating Mellanox NIC Firmware/Software

Here are the Mellanox NIC firmware and software update instructions, where the Mellanox ConnectX-6 Dx is installed in the free full height PCI express x16 slot, next to the GPU.

Required Components

- MLNX_WinOF2-23_7_50000_All_x64.exe
- Rivermax_1.31.10_installer.msi
- WinMFT_x64_4_25_0_62.exe
- ConnectX6Dx_FW_22_38_1002.bin (for 25 GbE Mellanox hardware, model MCX-623102AN)
- ConnectX6Dx_MCX623106AN-CDAT_FW_22_38_1002.bin (for 100 GbE Mellanox hardware, model MCX623106AN)

Installation Guidelines

- If upgrading from a previous release, uninstall Rivermax ST2110 stack, Mellanox NIC drivers, and WinMFT.
- Install Mellanox NIC driver: MLNX_WinOF2-23_7_50000_All_x64.exe
- Install Rivermax ST2110 stack: Rivermax_1.31.10_installer.msi
- Licensing: The rivermax.lic (issued by the licensing department for the purchase) must be in C:\Program Files\Mellanox\Rivermax\lib\
- Firmware Upgrade: Install with WinMFT_x64_4_25_0_62.exe to install the Mellanox Firmware Tools to burn the firmware. The required firmware version for Live Source is 22_38_1002.

Using Mellanox Firmware Tools

Open a Command Prompt window with administrator privileges, and run *C:\Program Files\Mellanox\WinMFT\mst status -v* to find the MST device ID

The command returns bus data from the NIC, similar to this:

```
mt4125_pciconf0          bus:dev.fn=02:00.0
mt4125_pciconf0.1        bus:dev.fn=02:00.1
```

In this example, `mt4125_pciconf0` is *Mellanox ConnectX-6 Dx Adapter* and `mt4125_pciconf0.1` is *Mellanox ConnectX-6 Dx Adapter #2*.

Note: The device ID of the card that is to be flashed is *4125*. Do NOT flash NIC cards with another ID (for example, *mt4127*.)

Burn firmware using the following commands, one by one:

```
flint -d mt4125_pciconf0 -i ConnectX6Dx_FW_22_38_1002.bin burn
flint -d mt4125_pciconf0.1 -i ConnectX6Dx_FW_22_38_1002.bin burn
```

Note: For systems with a 100 GbE Mellanox NIC installed (MCX623106AN,) use the *ConnectX6Dx_MCX623106AN-CDAT_FW_22_38_1002.bin* file.

After updating, re-enter the network settings for the Mellanox adapters.

Nvidia Graphics Driver Installation Steps

If a new version of the NVIDIA Graphics driver is required:

1. Uninstall the NVIDIA Graphics Driver via the Windows Apps & Features Control Panel.
2. Install the driver for your Lightspeed Live Server using the installer in *Installers\Nvidia*. Using the Advanced options > Clean Install is recommended.
3. After updating the NVIDIA driver, be sure to reset your GPU to operate in TCC mode (see *Setting Your NVIDIA GPU to TCC Mode*).

Nvidia AJA Driver & Firmware Installation Steps

If a new version of the AJA driver for Corvid-based SDI capture is required:

1. Uninstall AJA NT2V Drivers from Windows Apps & Features Control Panel
2. Install new AJA driver from the installer located in the *Installers\AJA Drivers and Firmware\Driver* folder.

If a new version of AJA firmware is required:

1. Open cmd.exe and change the directory to *Installers\AJA Drivers and Firmware\Firmware*.
2. Identify the BIT (~.bit) file appropriate for your Corvid hardware.

3. On a single Corvid card system run `ntv2firmwareinstaller -p [corvid_999.bit]` where `999` is the version number.
4. For a system with multiple Corvid cards, direct the target of the update with the -d argument. For example:

   ```
   ntv2firmwareinstaller -d0 [corvid_xxx.bit]
   ntv2firmwareinstaller -d1 [corvid_xxx.bit]
   ```

5. Power down the system and restart it, to enable the system to initialize the cards with the new firmware.

Updating | Installing Live Capture Software

This topic describes updating or installing Live Capture on your Live Capture server.

For Live Capture Software licensing requirements, see *Software-Only Licensing*.

For supported platforms and minimum platform requirements, see *Live Capture Software-Only Server Requirements*.

All of the required files for each release are located in the Installer folder:

- Live Capture Installer
- Vantage Updates
- Driver and firmware installation

Installation Steps

To update the Live Capture software:

1. Install Vantage if required—see the Vantage Domain Management and Installation Guide on the Telestream web site.

   Configure the installer to install these services:

   – Vantage Analysis Service
   – Vantage Avid Service
   – Vantage Cloud Service
   – Vantage Transcode Service—you should not install this service if the Capture server is going to be added to an existing Vantage domain.
   – Vantage Communicate Service
   – Vantage Metadata Service
   – Vantage Monitor Service
   – Vantage SDK Service
   – Vantage Transport Service

2. If a new Vantage Update Pack is required, run the installer from the Vantage Updates folder.
3. Install Live Capture using the installer in the Live Capture Installer folder and follow the steps in the installer.
4. On the Installer Options panel:

   – *Disable Automatic Registry configuration*—The installer creates the required registry settings automatically. Generally this setting should unchecked so that the registry settings are created, but you can enable it if you are making the required registry settings prior to installation.
   – *(Software Only Capture) Enable GPU Encoding*—This is for software-based Live Capture systems—VM | cloud, for example. The installer automatically enables GPU support on the target system if it detects a GPU. If no GPU is detected, you can enable this setting to force GPU support.

Note: Note: if GPU emulation on the VM is not supported or not correctly configured, this causes Capture jobs to fail.

   – *Clean Install*—Enable to reset the Source Manager etcd database to default values.

Caution: Clean installation of Live Capture deletes all Live Source settings.

---

5. Click OK to perform the installation per your settings.
6. Restart the server.

Installing Live Capture

To update the Live Capture software, follow these steps:

1. Uninstall Telestream Live Capture using the Windows Apps & Features Control Panel.
2. If a new Vantage Update pack is required, run the installer from the *Installers\Vantage Updates* folder.
3. Install the new version of Telestream Live Capture from the *Installers\Live Capture Installer* folder and follow the steps in the installer.
4. On the Installer Options panel:
   - Disable Automatic Registry configuration—The installer creates these settings automatically. Generally this setting should be left disabled, but you can enable it if the installer will be making the required changes prior to installation.
   - (Software Only Capture) Enable GPU Encoding—for VM-based Live Capture systems. When checked, the installer enables GPU support on the target system if it detects a GPU. If no GPU is detected, you can enable this setting to force GPU support.
   - Clean Install—Enable to reset the Source Manager etcd database to default values. Note: Performing a clean installation of Live Capture deletes all Live Source settings and you must recreate them.
5. Restart the Live Capture server.

Restarting the Telestream Live Source Service

If you changed server settings to join an array or change port numbers, the Telestream Live Source Service should be stopped and restarted to operate under the new settings.

For a single Live Capture server, stop and restart the Live Source Service.

To restart Capture servers in an array, follow these steps on each server in the array:

1. On each server except the Vantage database server, open the Services control panel and stop the Telestream Live Source service.

Note: In Task Manager, make sure that the processes supported by the services have also terminated before continuing. It may take a minute for source processes to terminate before you can start the Vantage Live Service again. You may need to manually terminate the Live Source process.

---

2. Now, restart the Live Source Service.
3. Shut down and reboot the Vantage domain server.

The sources from all Live Capture servers should now display in the Live Source Manager web app.

Firewalls and Blocked Ports Limit Functionality

If you have firewalls and/or blocked ports you may not be able to access each of the Live Capture servers in an array. The servers display, but, for example, you may not be able to configure Channel settings or view the sources.

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

For details about firewalls and port usage in Capture, see *Web App Ports and Windows Firewall Settings*. For information about firewalls in Vantage, also see *Firewall Guidelines* in the *Vantage Domain Management Guide*.

Creating a UNC Path for Resource Locations

When multiple Live Capture servers are joined together, you should specify the *Resource Location* for assets as a UNC path. This allows different servers to access the assets used for segment materials. See *Using Live Stores for Capturing Files* for details.

Configuring Various Actions on Arrays

A Live Capture license includes a Vantage array license. When a Live Capture workflow executes, the Capture (an origin) action process executes on the local Live Capture server. However, other Vantage services—such as Vantage Transport and Deploy services—can run on any server that has the required resources for the service.

You can optionally implement Run on Rules to ensure that these actions run on the same server as the capture, to simplify workflows. See the Vantage Domain Management Guide and Vantage User's Guide for information about creating and using Run on Rules.

When Capturing to a Live Capture Local Media Drive

When you are using a Capture action to capture directly to a Live Store that is configured to write to a local drive, Vantage auto-generates Run on Rules for the workflow actions following the Capture action that operate on the output of the Capture action to execute directly on the same Capture server. You may also set up manual Run on Rules to make this limitation clear in the workflow.

If you specify that the capture output is to be written to a UNC folder, Run on Rules are not generated, and subsequent actions which operate on the capture output may be executed anywhere, unless you establish Run on Rules to the contrary.

For actions that do not immediately follow the Capture action, best practice is to set Run on Rules that instruct processes for actions other than Capture to run on the Live Capture server where the media resides. See Configuring an Action's Run on Rules in the Vantage User Guide for more information.

When Capturing to Shared External Storage

When you are capturing to a shared external storage location, such as a NAS or SAN with Capture as part of a larger Vantage array, you can execute the transport actions on any server with available resources. In this case, Run on Rules are not required. Your system automatically chooses an available service on any server that can execute the required action.

See *Scaling Live Capture with Multiple Servers* for information about setting up a Vantage array for Live Capture. See also *Using Live Stores for Capturing Files* for more details.

Scaling Live Capture with Multiple Servers

Your Lightspeed Live Server is factory-configured as a standalone Live Capture system, including a Vantage domain, with Vantage services, client applications, and the Vantage database). If you plan to create an array of multiple Lightspeed Live Servers, or add Live Capture servers to a Vantage array, you can do this in two ways:

- For Capture-only systems, join all Live Capture servers together by creating an array that utilizes a single Vantage domain database.
- For Capture systems that use other Vantage services and workflows, such as Transcoding and Analysis, add your Live Capture servers to the existing Vantage domain.

Connecting Multiple Capture Servers to a Vantage Domain

Vantage database and Live Capture web application traffic can affect Live Capture server performance. Therefore, either as a Capture-only Vantage array or a single-server Vantage domain, Telestream recommends that the Vantage database and IIS hosting the Live Capture/Vantage web applications run on a dedicated server. See images below and *Best Practices for Capture Array Design*.

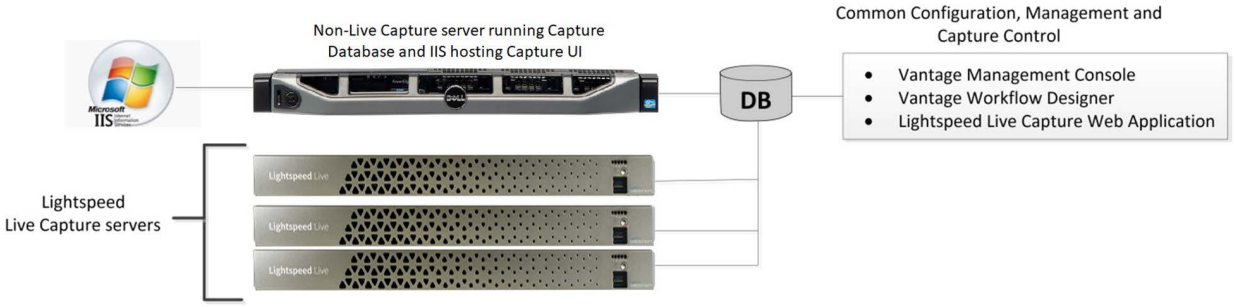
Further information regarding running the database and IIS on non-Live Capture/ Vantage servers is located in the Vantage Domain Management Guide.

It is also highly recommended that the process of creating a Vantage domain with Live Capture servers be performed as part of the installation and commissioning phase.

Note: When two or more Live Capture servers are combined into an array or joined to an existing Vantage domain, only those ComponentPacs that are installed on the server hosting the Vantage database are utilized.
Verify that all of the required ComponentPacs are installed on the Vantage database host.
The Vantage Transcode Service should be uninstalled from Live Capture servers, using the Vantage Management Console. To preserve optimum live capture performance, you should not perform additional Vantage transcoding on Live Capture servers.

Joining Capture-Only Systems

You can join two or more Lightspeed Live Servers together to form a multi- server Live Capture-only system. This allows for common configuration, management, and capture control.



To join Lightspeed Live Servers together, follow these steps:

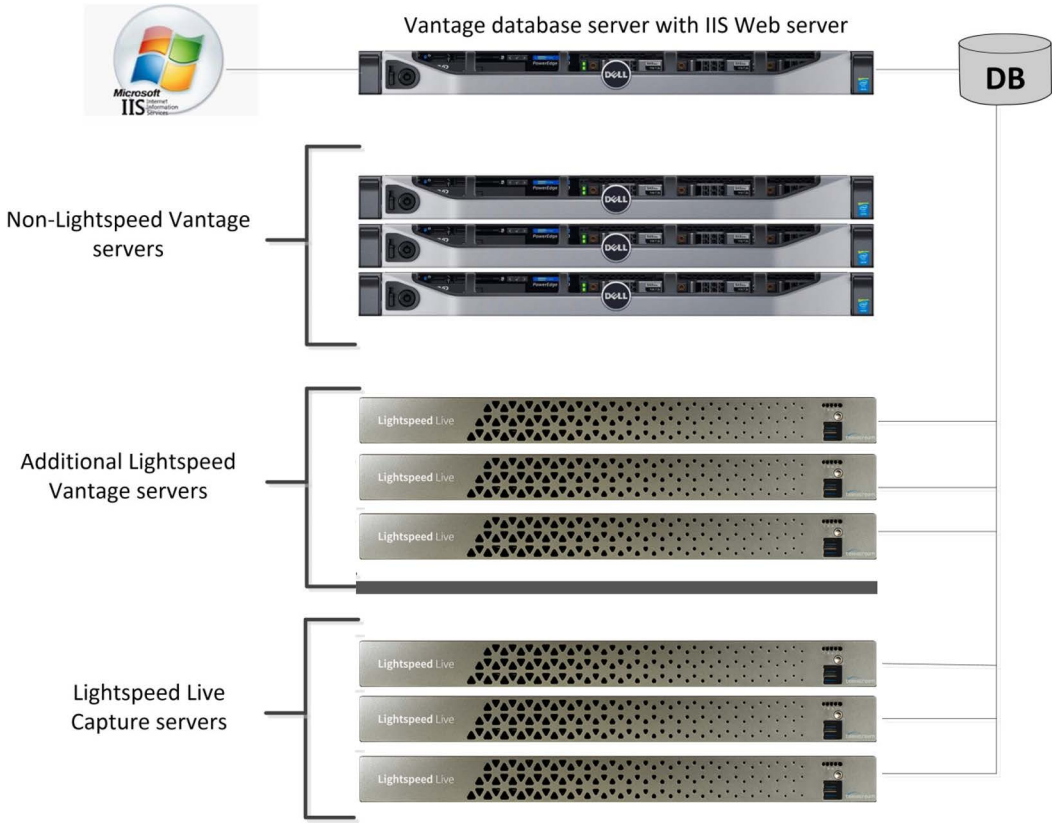
1. Select one of your Lightspeed Live Servers to act as the Vantage domain database server. The domain database server hosts the domain database and has all the services running on other Lightspeed Live Servers added to it via the Vantage Management Console.
2. Add all services running on your Lightspeed Live Servers to the Vantage domain, using the Vantage Domain Management Console. See the *Vantage Domain Management Guide* for details on adding services.
3. Add the appropriate multiple-server Vantage license to the domain. See the *Vantage Domain Management Guide* for details on licensing.

To configure, manage, and control your system, connect the Vantage Management Console, Vantage Workflow Designer, and Live Capture web applications to the domain named with the same name as the database server selected in Step 1, above.

Also see, *Configuring Various Actions on Arrays*.

Existing Vantage Array—Adding Live Capture Servers

Joining Lightspeed Live Servers to a Vantage array enables Vantage workflows to begin with a Capture origin action that is connected to other Vantage actions and services, such as general transcoding, IPTV/VOD transcoding, analysis, third party application control, delivery options, or other service/action types.



Adding Services

The Lightspeed Live Server hosts Vantage services, so adding these services to an existing Vantage array is no different than adding any other Vantage service running on a separate server to a Vantage array.

Important Note: Joining Live Capture services to an existing Vantage array requires specific Vantage array licensing. See the *Vantage Domain Management Guide* for details.

To add Live Capture services to a Vantage array, follow these steps:

1. Verify that the Live Capture services are running, all Vantage Services are running on the server, and no jobs are being processed in the local, factory-installed all-in-one domain.

2. Verify that you have configured the other (non-Lightspeed) Vantage domain server with the array, and is running. Refer to the *Vantage Domain Management Guide* > *Installing a Vantage Distributed Domain*, for more details.
3. Verify that the Lightspeed Live Server is on the same network as the Vantage array, with sufficient network permissions and access. Refer to the *Vantage Domain Management Guide* > *Network Requirements*, to configure your network.
4. Start the Vantage Management Console, and select the new Vantage array.
5. Add the services on the Lightspeed Live Server to the new Vantage array, just as you would do with any Vantage services running on any Vantage server. Refer to the *Up and Running Checklist* for configuring services with appropriate Windows user accounts.
6. Apply the appropriate Vantage array license onto the system running the Vantage domain database. See the *Vantage Domain Management Guide* for details on licensing.

Also see *Configuring Various Actions on Arrays*.

Providing Capture Sources Unique Names

It is a requirement that each capture source has a unique name when multiple Live Capture servers are part of an array. You should change the default source names to make them unique and identifiable in the scope of the array.

By default, Source names are named *SDI [1 through n]*, where *n* is 4 or 8 depending on server. For example, SDI names for a 4-channel server are:

SDI 1 | *SDI 2* | *SDI 3* | *SDI 4*

If you change source names using the Source Manager (*Managing Video Sources*), keep in mind that all sources in an array must be uniquely named so you can easily distinguish sources on one server from sources on another.

Best Practices for Capture Array Design

The best practice for using multiple Live Capture server systems (an *array*) is to install and run the Vantage domain database and IIS on a dedicated server, separate from the Vantage and Live Capture servers. See the *Vantage Domain Management Guide* for details on installing a Vantage database and IIS.

When clustering two or more Live Capture and Vantage servers together, best practice is to use a separate server designated as the IIS web server to host the Live Capture web application. Ideally, the web host should be separate from the Vantage domain database since both IIS and SQL can consume a considerable amount of system resources.

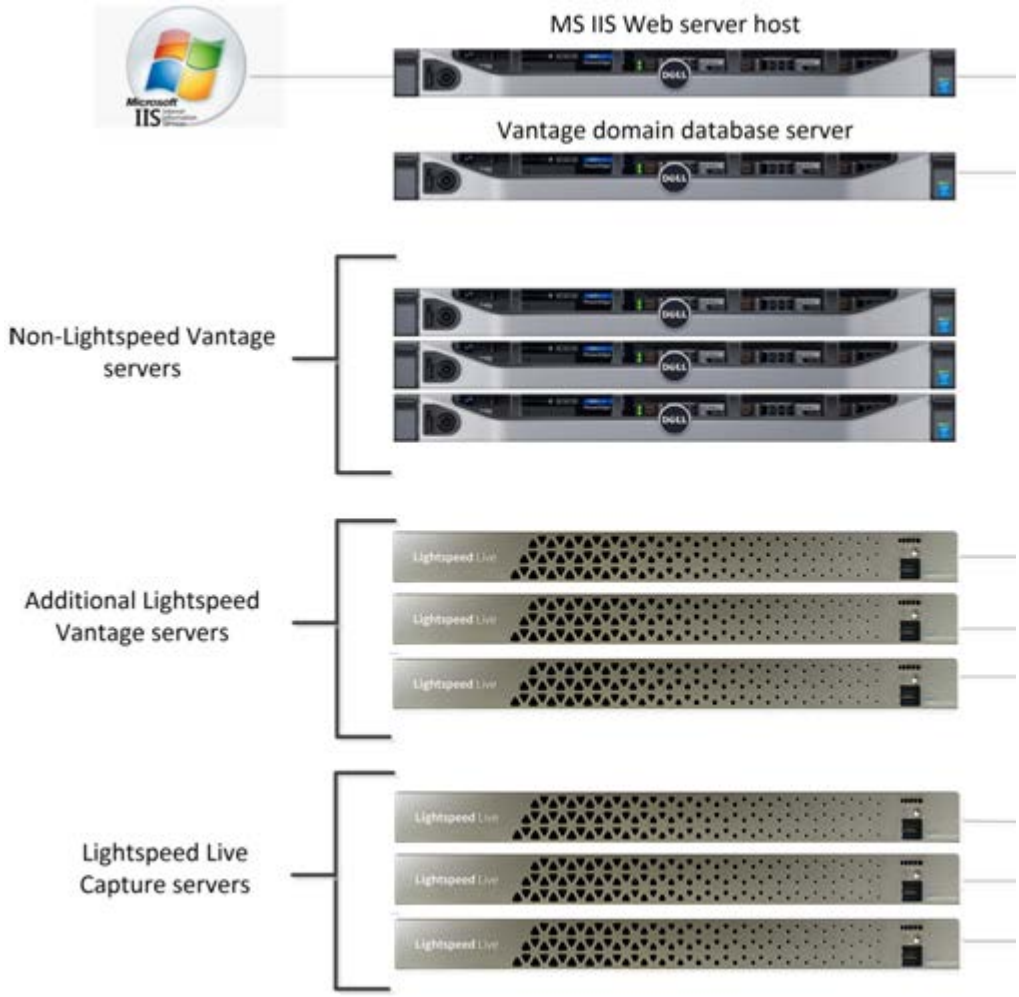
The following are two example systems utilizing a dedicated Vantage database and IIS web server.

Capture-only System

In this example, the Vantage domain database and IIS are installed together on a dedicated server. This prevents database and web server resources consumption from affecting the Live Capture servers.

Capture Array—Separate Vantage Database and IIS Web Servers

In this example, the Vantage domain database and IIS are each installed on dedicated servers.



Since this is a large system, containing six Vantage systems and three Live Capture servers, hosting the database and web server separately from all other servers running Vantage services is recommended to prevent overhead resource consumption from affecting the Live Capture and Vantage servers.

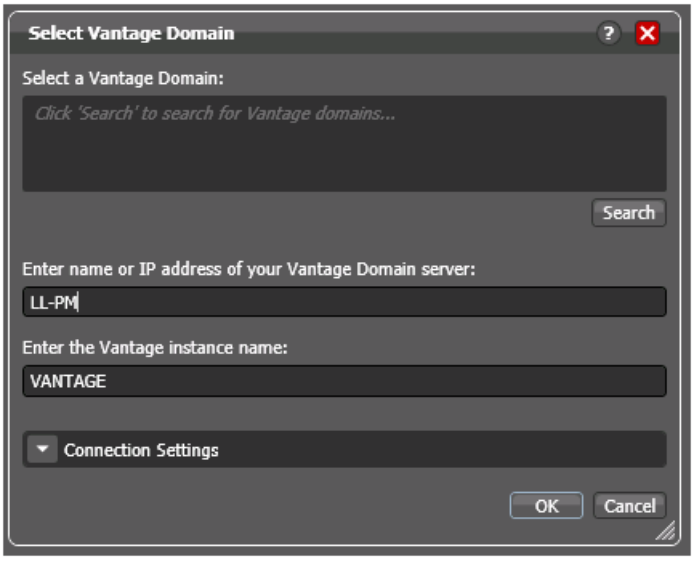
For additional information on best practices for Vantage and Vantage databases, refer to the *Vantage Domain Management Guide* and the *Planning and Setting Up Your Vantage Database* publication on the Telestream web site.

Using Web Applications in a Capture Array

When you have multiple Capture servers in an array—where the Vantage database and web server typically are hosted on different, dedicated server(s)—Vantage client applications and/or Live Capture web applications must be configured to connect to Vantage via the database server.

Configuring Vantage Client Applications for Multiple Servers

Connect to your domain by selecting the database server in the *Select Vantage Domain* dialog in each Vantage client program:



Using Vantage Desktop Client Applications

First, install the *Vantage Management Console* and *Vantage Workflow Designer* client applications on any Windows system on your network. To use these client applications, you must change the Vantage Domain so they connect to the server that is running the Vantage domain database.

Select *Change Vantage Domains* from the File menu of each client application to open the *Select Vantage Domain* dialog.

Note: To learn more about the *Vantage Management Console* or *Vantage Workflow Designer*, click the ? icon to display the topic for the feature that you are using. Or, use the Help menu to open the searchable *Vantage User Guide* for general help.

Using the Live Capture Web App to Manage Multiple Servers

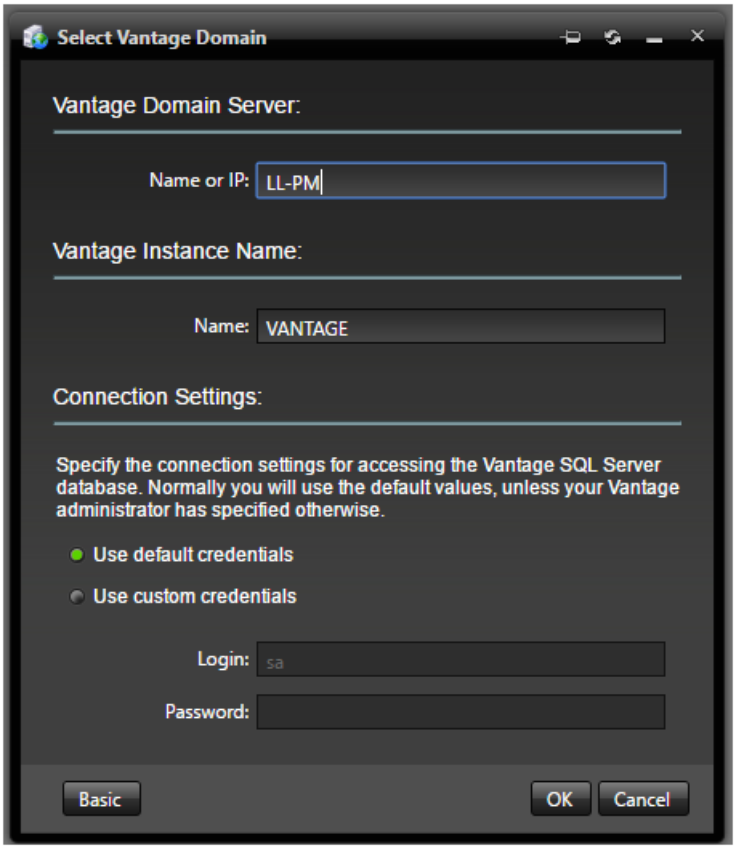
To use the Live Capture web application with multiple servers, first install the Vantage web applications on the server hosting the IIS Web Service.

To open the Live Capture web application, use the following URL:

http://`<IIS Web service Host Name>`*/Vantage*

... where `<IIS Web service Host Name>` is the DNS name of the computer hosting the IIS Web Service.

Vantage displays the Select Vantage Domain dialog:



In the Name or IP field, enter the server hosting the Vantage domain database and click OK to log in.

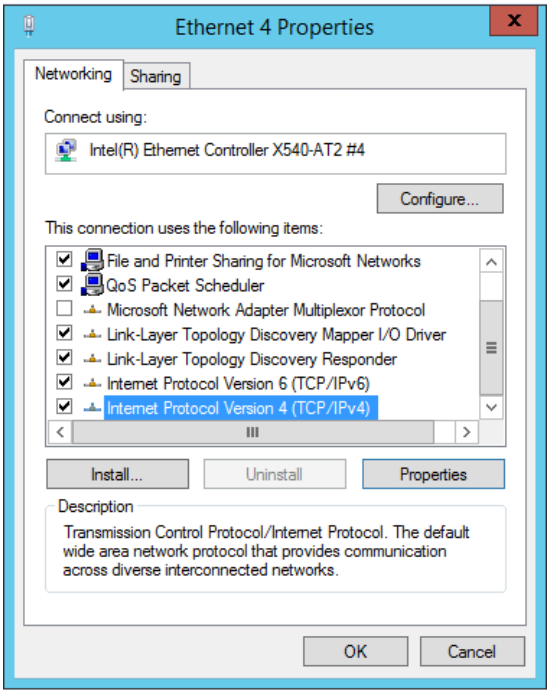
Using NetBIOS Host Names

You can use a Vantage array without an external name server, when NetBIOS is enabled in the database server and all nodes.

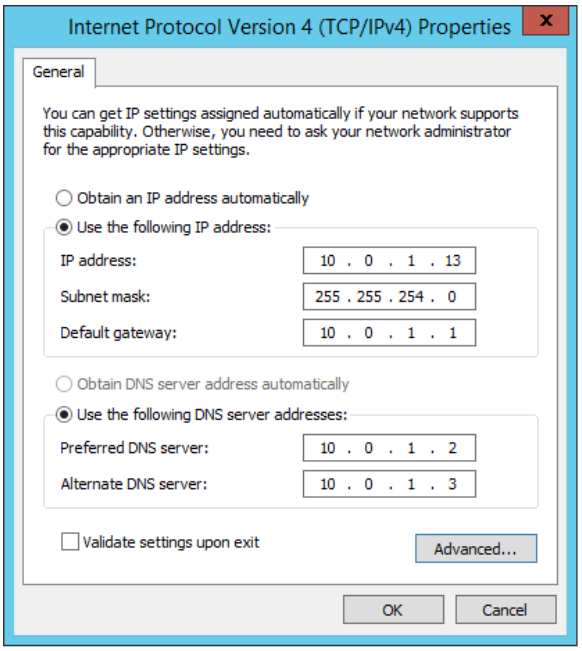
Note: NetBIOS only resolves names of Windows computers on the local subnet. If there are client or host systems on multiple subnets or you are using clients on other platforms, you must use DNS or a local hosts table.

Configure the following settings in all servers to enable NetBIOS:

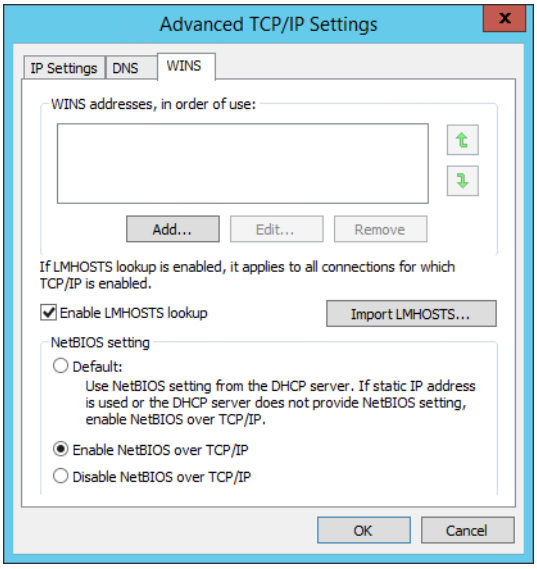
1. Open the Control Panel and select Network and Sharing Center.
2. Select the Change Adapter Settings option to open Network Connections.
3. Right-click on the network connection to change and select Properties. The Properties dialog displays:



4. Select TCP/IPv4 and click the Properties button. The TCP/IPv4 dialog displays:



5. Configure the IP Address, unique for each server.
6. Configure the Subnet Mask, Default Gateway, and the DNS server address settings. Use the same addresses for each server.
7. Click the Advanced button. The Advanced TCP/IP Settings dialog displays:



8. Select the WINS tab, then select Enable NetBIOS over TCP/IP.
9. Click OK in all dialogs to save the configuration.
10. Reboot the server you just configured, then configure all other servers.

Correcting Connection Errors in Web Apps

When using Live Capture web applications on a workstation and connecting to a Capture server via the network, you may experience connection problems if you aren't using DNS.

Note: Name resolution is required for all computers in a Capture system—via NetBIOS, DNS, or local hosts tables.

For example, you may see a *No Event* message instead of video thumbnails.

To facilitate connections on servers | workstations that do not utilize external DNS:

- Capture arrays require connections using host names, not IP addresses
- If external DNS is not available, host name resolution should be configured as described following.

Update the *hosts* file on the computer you're using to run the web apps. This procedure describes how to correct this problem for Mac OS and Windows workstations.

Sample hosts File

Here is an example hosts file (whose content is identical for MacOS and Windows), showing various servers in a multi-server, Live Capture domain:

```
# SAMPLE LIVE CAPTURE DOMAIN
   16.160.26.57 Capture--Anaheim-57 # Vantage database
   16.160.26.55 Capture-LS-Anaheim-60 # Vantage Services
   16.160.26.19 Capture-LSLC4-Northridge-17 # Live Capture Service
   16.160.26.18 Capture-LSLC4-Burbank-103 # Live Capture Service
   16.160.26.25 Capture-LSLC5-Burbank-104 # Live Capture Service
   16.0.20.72 LS-Burbank-64 # Web apps server
```

Here is an example hosts file with a single entry, for a computer workstation which is running Live Capture web apps—an operator, fore example—which identifies the IIS web server:

```
   16.0.20.72    LS-Burbank-64    # Web apps server
```

Updating the hosts File on Mac OS

On a Mac OS computer, add each server IP address and host name to the *~/etc/hosts* file and save it. Perform these steps:

1. Open the Terminal application—go to Application > Utilities and double-click Terminal.app.
2. Enter *sudo nano/etc/hosts* and press Return.
3. Enter the administrator password for the computer and press Return.

4. Place the cursor after all of the text in the window and type the IP address of your Live Capture server. For example: `102.54.94.97`
5. Press the Tab key, then type the host name of the Live Capture server. For example: `CaptureServer1`
6. Hold down the Control and 0 keys and press Return.
7. Press Ctrl-x to exit.
8. Flush your DNS table by executing *sudo killall -HUP mDNSResponder* in Terminal.
9. Quit the Terminal application.

Updating the hosts File on Windows

On a Windows computer, add each server IP address and host name to the *hosts* file and save it. Perform these steps:

1. In File Explorer, navigate to: C:\Windows\System32\drivers\etc.
2. Open the *hosts* file in Notepad.
3. On a new line, enter the IP address of your Live Capture server.

   For example: `102.54.94.97`
4. Press the Tab key and enter the host name of your Live Capture server.

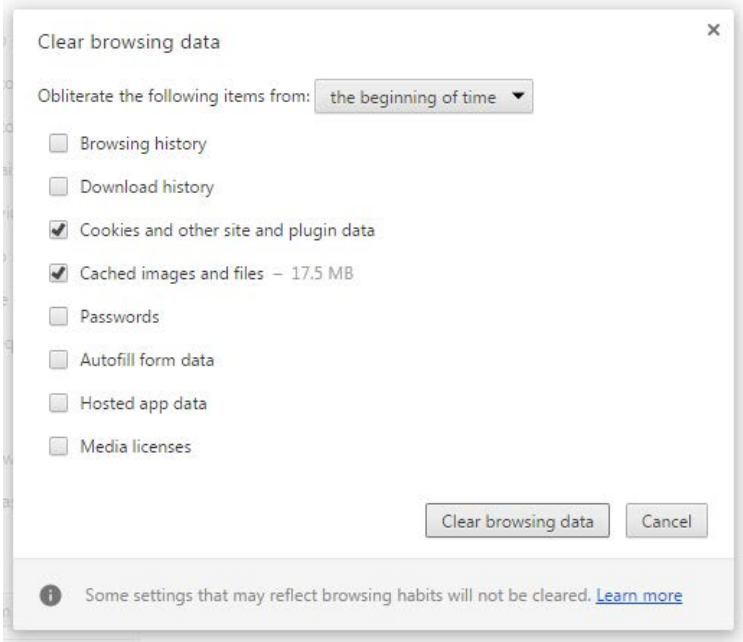
   For example: `CaptureServer1`
5. Save the file and close Notepad.

Clearing Browsing Data after Updating Vantage or Live Capture

After you have performed a Vantage version upgrade or ComponentPac update on your Live Capture server or other Vantage domain being used in conjunction with Live Capture, you should clear the browsing data in your browser in order for the Live Capture web applications to operate properly.

Follow these steps to clear the browsing data:

1. In Chrome, select Clear browsing data... from the More menu to display the Clear browsing data dialog.



2. Select The beginning of time from the Obliterate the following items menu, then check Cookies and other site and plugin data and Cached images and files.
3. Click the Clear Browsing Data button,

Installing | Updating Live Capture

Telestream periodically updates Live Capture. This chapter provides a checklist of the tasks to perform to update your Lightspeed Live Server with the current version.

This chapter also describes how to install Live Capture Software Only on a VM platform.

These checklists identify the tasks to perform, not how to perform them. For advanced procedures, a detailed reference topic is provided.

Topics

Obtaining the Live Capture Installer

To obtain the current Live Capture installer, follow these steps:

1. Go to the Telestream Download Center and log in with your authorized user name and password.
2. Click Download to copy the Live Capture ZIP file to your computer.
3. When download is complete, go to your Downloads folder and copy the Live Capture ZIP file to each Lightspeed Live Server that you plan to update.

Updating Lightspeed Live Capture

Lightspeed Live Servers ship with Live Capture and Vantage pre-installed.

Note: Ensure that the C drive has at least 5GB free space available after installation. Inadequate free space can cause unpredictable Live Capture behavior, including inability to add sources. At least ten percent of the total drive space should be free, as a general guideline.

This checklist identifies the tasks that you should perform when you initially install your Lightspeed Live Server(s) to verify that all software components are up to date and operational, or to update a previous version of Live Capture to the current version.

If you have a Live Capture array, these tasks pertain to each server in the array.

Quiesce the Lightspeed Live Server

1. In Vantage Workflow Designer, wait for current capture jobs to complete or stop them.
   a. To stop capture jobs in Live Capture or Tape Capture, halt the capture operation.
   b. In Live Schedule, halt any scheduled captures that are planned during this downtime.
   c. In Vantage Workflow Designer, deactivate all Capture and Tape workflows.

Verifying DNS Resolution

2. Verify that DNS resolution is functioning. If the server is not in DNS, hosts files should be configured on the server and clients.

Note: You may get a false sense that DNS is working when it is not—Windows computers on the same subnet will resolve based on NETBIOS. However, NETBIOS doesn't operate across subnets or on workstations other than Windows.

- For servers with DNS:

  Open a command prompt or PowerShell (Windows) or Terminal (OSX/Linux) and perform *nslookup* both ways—forward and reverse—both are required.
  For example: `nslookup lsl-Capture1` and `nslookup 10.0.23.143`.

- For servers without DNS:

  Create/update the hosts file:

  Windows: *C:\Windows\System32\drivers\etc\hosts*

  OSX/Linux: */etc/hosts*

Install Live Capture

3. Unzip the Live Capture ZIP file that you downloaded and copied to the server. It contains these folders:

- Documentation—user guides, app notes, data sheets, and release notes
- Installers...
  - AJA Drivers and Firmware
  - ipmitool
  - Live Capture Installer
  - LSA-Raid
  - Mellanox
  - Nvidia
  - USB-422-set-pin-high
  - USB-Serial-v2.12.24-Drivers
  - Vantage8.1U5
- SNMP—MIB files and readme

4. Use Windows > Programs > Uninstall or Change a Program to uninstall Telestream Live Capture and Telestream Live Source (and their services) from the server before installing the new version.
5. Run the Telestream Live Capture Setup installer and follow the instructions. The installer package contains the appropriate drivers and firmware, however it does not install them.
6. When Live Capture installation completes, the installer prompts you to restart the server.

Note: If you logged in with a user ID other than local user Administrator, the system won't restart. This is due to default security policies in Windows server. Restart manually or—as system administrator—set the Shut down the system local security policy to allow the logged in user to restart the server.

---

7. In the Window Administrative Tools > Services, verify that these updated Telestream services are installed and started:
   - Vantage Live Service
   - Telestream Live Source Service.
8. Ensure that all Telestream services are running as the same user, with proper file access authority.

9. Update the NVIDIA driver if a new version is required.

   In Windows > Programs > Uninstall or Change a Program, compare the *NVIDIA Graphics Driver <999.99>* program (for example, `V535.98`) to the Live Capture 3.6.2\Installers\Nvidia\C2-C3-C4\ driver's exe file version (for example, *535.98-nvidia-rtx-winserv-2019-2022-64bit-international-dch-whql*).

   If the installer's version is new (a higher version number) than the installed driver's version, uninstall the NVIDIA Graphics Driver from the Windows Apps & Features control panel and install the driver for your Lightspeed Live Server from *Installers\Nvidia\C2-C3-C4-C5*. Advanced options > Clean Install is recommended.

   a. After updating the driver, be sure to set the GPU to TCC mode—see *Setting Your NVIDIA GPU to TCC Mode*.

10. Install AJA drivers on your Corvid card when a new version is required:

    a. Uninstall the AJA NT2V driver from Windows Apps & Features control panel

    b. Install new AJA driver from *Installers\AJA Drivers and Firmware\Driver*.

11. Install AJA firmware if a new version is required:

    a. Run *cmd.exe* and change directory to *Installers\AJA Drivers and Firmware\Firmware*

    b. Identify the *.bit file appropriate for your Corvid card.

    c. Run *ntv2firmwareinstaller -p [corvid_xxx.bit]*.

    d. Power down and unplug the Lightspeed Live Server for at least 2 minutes, and restart it to enable the card to initialize with the new firmware.

12. Launch the Live Stream web app from a client workstation using a host name (not *localhost*) to verify DNS resolution: `http://<HOSTNAME>:8089`.

13. In the Live Stream web app, perform initial SDI source testing:

    a. Verify SDI port connections on the Lightspeed Live Server.

    b. Confirm all SDI inputs are present and show valid video.

    c. Edit configurations for each SDI input to set bit depth, timecode source, PsF, etc.

    d. Disable loop through and free run timecode.

    e. Set only frame-accurate timecode sources (LTC | Source). Computer clock is not frame accurate and is rarely adequate.

       LTC is obtained from the LTC port, thus is common to all SDI inputs—you can not use different LTC sources. When using LTC, you may need to increase timecode level/amplitude to obtain a valid signal.

14. Log in with your credentials (default *admin/live!*).

15. See Live Capture User Guide > Configuring SDI Sources to set up an SDI stream and confirm that you can preview it and start streaming.

For a group only...

16. Back in Group Portal, remove the server from maintenance mode.

Updating Vantage

You should audit Vantage to verify that it is up to date—and update it if required—before updating Live Capture.

Follow these steps:

1. In the Vantage Management Console, display Help > Database and verify that the version is 8.1.0.
2. In Windows > System > Apps & Features verify that Vantage 8.1 Update Pack 5 is installed.
3. If any of these are earlier than the minimum required version, proceed to Updating Live Capture Software.

Installing Live Capture SW on a Virtual Machine

You can install Live Capture Software Only edition on a Windows Server2019 virtual machine (VM), and is intended as a resource-limited scaling of Live Capture capacity. The VM platform must meet baseline requirements—see Live Capture Software-Only Server Requirements for details.

Live Capture VM licensing allows one active Vantage Capture workflow per license, excluding the use of GPU-based encoders for AVC and HEVC formats for primary or secondary output in Capture workflows. See Software-Only Licensing.

If Live Capture is licensed for a single active workflow, system CPU resources may be better utilized if the source channel's Assign Processor control is disabled. See Live Capture User Guide > Configuring SDI Sources to disable Assign Processor (if displayed in the panel—model dependent).

1. When Live Capture installation completes, the installer prompts you to restart the server. If you logged in with a user ID other than local user Administrator, the system won't restart. This is due to default security policies in Windows server. Restart manually or (as system administrator), set the Shut down the system local security policy to allow the logged in user to restart the server.

Updating the Mellanox Card

Use this topic to install a Mellanox ConnectX-6 Dx NIC Card in a C2+ | C4 Lightspeed Live Server, update drivers, firmware, etc.

Downloading Mellanox and Nvidia Installers

Download these installers:

1. Download the Mellanox Windows host controller driver *MLNX_WinOF2_All_AllOS_x64_release_2_940_22711_18.exe* installer from https://network.nvidia.com/products/adapter-software/ethernet/windows/winof-2/.

2. Download the Mellanox firmware installer from https://network.nvidia.com/support/firmware/connectx6dx/.
3. Download the MFT tools installer from https://network.nvidia.com/products/adapter-software/firmware-tools/.
4. Download the mlxup tool installer from https://network.nvidia.com/support/firmware/mlxup-mft/.
5. Download the Rivermax SDK (installer) from the Nvidia Developer Program. Programmer membership is required to download the Rivermax SDK.

Installing/Updating the Mellanox NIC and Rivermax Drivers

To update the Mellanox NIC driver, follow these steps:

1. Run MLNX_WinOF2_All_AllOS_x64_release_2_940_22711_18.exe and follow the steps in the installer.
2. If you are configuring this server with a static IP address, set it now, before restarting the server.

Installing/Updating Rivermax for ST 2110

To update the Rivermax Library to support ST 2110 streaming, follow these steps:

1. Run the Rivermax_1.6.18_installer.msi and follow the instructions in the installer.
2. After installing the Rivermax library, copy the license file to *C:\Program Files\Mellanox\Rivermax\lib\rivermax.lic*.

Upgrading Mellanox Card Firmware

To update the firmware, use Mellanox Firmware Tools (installed with WinMFT_x64_4_15_1_9.exe).

The recommended firmware version is 22.33.1048.

Follow these steps using Mellanox Firmware Tools:

1. Open a command window with administrator privileges to find the MST device ID.
2. Execute `mst status -v`

   The console returns Mellanox card data, similar to this:

   ```
   mt4125_pciconf0 bus:dev.fn=02:00.0
   mt4125_pciconf0.1 bus:dev.fn=02:00.1
   ```

   In this example, `mt4125_pciconf0` is Mellanox ConnectX-6 Dx Adapter #1 and `mt4125_pciconf0.1` is Mellanox ConnectX-6 Dx Adapter #2.
3. Update the firmware for each device with the following command:

   ```
   flint -d mt4125_pciconf0 -i ConnectX6Dx_FW_22_33_1048.bin burn
   ```
4. Repeat for the second device:

   ```
   flint -d mt4125_pciconf0.1 -i ConnectX6Dx_FW_22_33_1048.bin burn
   ```

5. Verify network settings for the Mellanox NICs
6. Restart the server and proceed.

Configuring ST2110 Channels to use SDP Files

Paths to ST2110 compliant Session Description Protocol (.sdp) text files can be added to configure the Live Source ST2110 channel. At minimum, the path to the ST2110-20 video SDP file should be specified.

To support external patching, NMOS can be enabled for the Live Source ST2110 channel.

Basic requirements for the NMOS environment:

- An NMOS registry server, configured and deployed as required in a test environment
- NMOS ST2110 senders (for example, senders of ST2110-10/-20/-30 video, audio and data streams that are registered in the NMOS registry server)
- Telestream Live Source ST2110 channels that have the NMOS control enabled.

Install Bonjour for mDNS-based Discovery

Bonjour is required for environments where NMOS node devices do not support static IP address assignments, but has the limitation that all NMOS nodes and devices must be in the same subnet as the NMOS registry server. If Bonjour is needed, run the Bounjour64.msi installer on the NMOS registry server and the LightSpeed Live server and reboot the systems. Bonjour will then allow the devices to connect the registry server, to allow the NMOS registry to handle AMWA IS-04 Discovery.

Configuring a Live Source Connection to NMOS Registry Server

For environments where Bonjour is not needed or can't be used due to network policy, the Telestream Live Source Service can be configured to connect to the NMOS registry server, using Source Manager. For details, see the Live Capture User Guide.

The Telestream Live Source Service should restarted after making the changes. After the Telestream Live Source NMOS device is registered, ST2110 channels enabled as NMOS receivers will also be registered.

Patching NMOS Senders to NMOS Receivers

After the Telestream Live Source Service is registered, NMOS enabled ST2110 channels can be patched to NMOS senders (ST2110 video, audio and data streams.)

Bulk patching is not supported.

The Riedel NMOS Explorer can be used in a test environment for making patches. This application can be downloaded from https://myriedel.riedel.net/.

By default, the Riedel NMOS browser will try to connect to the Bonjour service. If Bonjour is not installed in the NMOS environment, the Riedel NMOS browser application will fail to start, but it also can be configured to connect directly to the NMOS registry host with a static IP, e.g. `http://10.0.5.174:3212/x-nmos/query/v1.3/` where:

`10.0.5.174:3212` is the NMOS registry host IP address and the query port used by the NMOS registry host

Rivermax error messages:

If the system is not licensed, an error is displayed when an ST2110 source process is started: "*Failed to Initialize Rivermax. Rivermax license file is missing, invalid, or incorrectly named (Rivermax error code 12)*".

If the driver/firmware is not properly installed, or the Mellanox NIC card is not properly inserted to the PCI-E slot: "*Failed to Initialize Rivermax. There are no Mellanox devices that support Rivermax (Rivermax error code 8.)*"

Mellanox Card | Rivermax Installation Checklist

Use the topics in this chapter to update the NVIDIA Mellanox ConnectX-6 Dx EN adapter card in a Lightspeed Live server for use with Live Capture, including installation of the Rivermax Media Library for ST 2110 and configuring ST 2110 sources in Source Manager.

Topics

Mellanox Card Specifications

The NVIDIA Mellanox ConnectX-6 Dx EN (900-9X6AG-0056-ST1/MCX623106AN-CDAT) is a 100GbE, dual-port QSFP56, PCIe 4.0 x16, tall bracket adapter card. It does not support on-board crypto.

Ethernet traffic is transmitted through the adapter's SFP28/SFP56/QSFP56 connectors. The networking connectors allow for the use of modules, optical and passive cable interconnect solutions.

The networking ports have a Bi-color LED and one single color LED to indicate traffic/error conditions.

Mellanox Card Installation Software

These installers and a license are required to perform the tasks in this checklist:

- Mellanox Windows host controller driver installer
- Mellanox firmware installer
- MFT tools installer

- Bonjour installer (optional)
- Rivermax Library license

Note: Before proceeding, locate these installers and copy the *Mellanox_Installers* folder over to the target C2+ | C4 | C5 Lightspeed Live server.

Updating the Mellanox Card

Use this topic to update drivers and firmware on a Mellanox ConnectX-6 Dx NIC in a Lightspeed Live server.

Quiesce the Lightspeed Live Capture Server

To update an operational C2+ | C4 Lightspeed Live server, follow these steps:

1. In Workflow Designer, wait for all current capture jobs to complete or stop them.
2. De-activate all active Capture and Tape workflows.
3. In Live Capture | Tape Capture web app, halt all capture operations.
4. In Live Schedule (if in use), halt events that are planned during this downtime.

Installing the Mellanox Driver and Verify NIC is Present

5. In the Installers > Mellanox folder, run the *MLNX_WinOF2_All_AllOS_x64_release_2_940_22711_18.exe* or later file to launch the installer; follow the directions.
6. When complete, right-click the Windows icon and select Network Connections.
7. See SXB1 Qr3A Port 1 and Port 2 icons to verify that Windows recognizes the Mellanox ports.
8. If the ports are missing, resolve by reseating the card and riser bracket and re-check before continuing.

Installing and Licensing Rivermax for ST 2110

Rivermax implements an API for media streaming applications. Rivermax runs on Mellanox ConnectX cards and makes use of ConnectX-dedicated hardware streaming accelerations. Rivermax enables compliance with SMPTE 2110-21, reducing CPU utilization and improving throughput.

To install Rivermax to support ST 2110 streaming, follow these steps:

1. In the Mellanox folder, run the *Rivermax_1.6.18_installer.msi* or later and follow the instructions in the installer.
2. After installation, copy the Rivermax license file which you received for this server to *C:\Program Files\Mellanox\Rivermax\lib*. Rename it to *rivermax.lic*.
3. To complete installation, restart the server. Windows updates may delay your ability to log in and continue.

Note: The Rivermax license for this Mellanox card will be delivered via email to the person performing installation. Each license is effective only for the specified serial numbered card. The *rivermax.lic* file in the installer directory may be used as a demo license if required.

Rivermax Error Messages

If the system is not licensed, an error displays when an ST 2110 source process is started: "Failed to Initialize Rivermax. Rivermax license file is missing, invalid, or incorrectly named (Rivermax error code 12)."

If the driver/firmware is not properly installed or the Mellanox NIC card is not properly inserted to the PCI-E slot, this error message displays: "Failed to initialize Rivermax. There are no Mellanox devices that support Rivermax (Rivermax error code 8)."

Upgrading Mellanox Card Firmware

To update the firmware, use the Mellanox Firmware Tools program, installed with *WinMFT_x64_4_15_1_9.exe* or later. The recommended firmware version is 22.33.1048.

1. Install Mellanox Firmware Tools (WinMFT64) if not already installed—run *WinMFT_x64_4_15_1_9.exe* or later to launch the installer; follow the instructions.
2. Open the Command Prompt window with administrator privileges and run '`C:\Program Files\Mellanox\MLNX_WinOF2\mst status -v`' to find the device ID.

   The console returns Mellanox card data, similar to this:

   ```
   mt4125_pciconf0 bus:dev.fn=02:00.0
   mt4125_pciconf0.1 bus:dev.fn=02:00.1
   ```

   In this example, `mt4125_pciconf0` is Mellanox ConnectX-6 Dx Adapter #1 and `mt4125_pciconf0.1` is Mellanox ConnectX-6 Dx Adapter #2.
3. For 25 GbE card (model MCX623102AN), update the firmware for each device with this command (where `d mt4125` should be changed to your card ID):

   ```
   flint -d mt4125_pciconf0 -i ConnectX6Dx_FW_22_33_1048.bin burn
   ```
4. Repeat for the second device:

   ```
   flint -d mt4125_pciconf0.1 -i ConnectX6Dx_FW_22_33_1048.bin burn
   ```
5. For 100 GbE card (model MCX623106AN), update the firmware with this command:

   ```
   flint -d mt4125_pciconf0 -i ConnectX6Dx_MCX623106AN-CDAT_F-
   W_22_33_1048.bin burn
   ```
6. Repeat for the second device:

   ```
   flint -d mt4125_pciconf0.1 -i ConnectX6Dx_MCX623106AN-CDAT_F-
   W_22_33_1048.bin burn
   ```

Note: For these commands, either supply a path to the BIN file or put the files in the same folder as flint: *C:\Program Files\Mellanox\WinMFT*.

Note: If the command fails with "*Command not found*", it's probably because the new environment variable hasn't been updated. Restart the server and try again, or specify the full path:
`C:\Program Files\Mellanox\WinMFT\flint -d mt4125_pciconf0 -i ConnectX6Dx_MCX623106AN-CDAT_FW_22_33_1048.bin burn`.

Configuring ST 2110 Sources Using SDP

If you aren't using NMOS, paths to ST 2110-compliant SDP (Session Description Protocol) text files (*.sdp) should be added to each channel's configuration in Live Source. At a minimum, you should specify the path to the ST 2110-20 video SDP file.

For each ST 2110 source, follow these steps in Source Manager:

1. Select ST 2110 to display its Configure Source dialog.
2. Disable the NMOS control to display its SDP file controls.
3. Supply fully-qualified paths to the video, audio, and ANC SDP files as appropriate.
4. Provide the video, audio, and ANC media index values, if required.

Configuring ST 2110 Sources Using NMOS

To support external patching, enable NMOS for the ST 2110 source.

These are the basic requirements for an NMOS environment:

- An NMOS registry server, configured and deployed as required within the test environment
- NMOS ST 2110 senders of ST 2110-10/-20/-30 video, audio and data streams that are registered in the NMOS registry server
- Telestream Live Source ST 2110 channels that have the NMOS control enabled in Source Manager.

Installing Bonjour for mDNS-based Discovery

Bonjour is required for environments where NMOS node devices do not support static IP address assignments, but has the limitation that all NMOS nodes and devices must be in the same subnet as the NMOS registry server. Bonjour allows the devices to connect to the registry server, enabling the NMOS registry to handle AMWA IS-04 Discovery.

If Bonjour is required, install it—run the *Bonjour64.msi* installer on the NMOS registry server and the Lightspeed Live server and reboot both systems.

Configuring Telestream Live Source Service for Connecting to the NMOS Registry Server

For environments where Bonjour isn't needed or can't be used due to network policy, configure the Live Source Service to connect to the NMOS registry server.

The NMOS settings only display on Lightspeed Live servers with a Mellanox card installed. After the Telestream Live Source NMOS device is registered, ST 2110 channels enabled as NMOS receivers are also registered.

Follow these steps:

1. Delete the etcd database or upgrade the Source version to display the NMOS settings. (The upgrade code re-adds the settings if they're missing for 2110 systems).
2. Launch Live Source Manager and select Settings > Manual NMOS Registration.
3. In the Manual NMOS Registration panel, enable Manual NMOS Registration. When enabled, update the registry address, registry port, API version, node port, and connection port
4. Click away when complete, to save these values and update the JSON config file.
5. Restart the Telestream Live Source Service for changes to take effect.

Note: Disable Manual NMOS Registration and save the System Settings to remove the registry_address, registration_port, and registry_version settings from the config file and restart the Telestream Live Source Service for changes to take effect.

Patching NMOS Senders to NMOS Receivers

After registering the Telestream Live Source Service, NMOS-enabled ST 2110 channels can be patched to NMOS senders (ST 2110 video, audio and data streams.) Bulk patching is not supported.

Note: In Source Manager, settings only display for ST 2110-based servers. If a Live Source 3.6.1 system is converted from SDI to ST 2110, the etcd db must be deleted or Live Source Manager must be upgraded in order for the NMOS settings to display.

You can use the Riedel NMOS Explorer in a test environment for making patches. Download this application from *https://myriedel.riedel.net/*.

The Riedel NMOS browser attempts to connect to the Bonjour service. If Bonjour is not installed, the Riedel NMOS browser application fails to start. Configure it to connect directly to the NMOS registry host with a static IP—for example: *http://10.0.5.174:3212/x-nmos/query/v1.3/* where:

- `10.0.5.174` is the NMOS registry host IP address
- `3212` is the query port used by the NMOS registry host.

Managing your Web Apps

Effective use of your Live Capture web apps requires a supported web browser, learning how to launch each web app and connect to a Live Capture server, and how to use the apps effectively in a networked environment and deal with changes in your network such as changing a Vantage domain name.

Topics

Web Application Browser Requirements

Vantage and Live Capture web applications are implemented for execution in Microsoft IIS. Java Script and cookies must be enabled to use Capture web applications properly.

Capture web apps are implemented for viewing in the Chrome browser, version 113.0.5672.93 or greater. Other browsers are not supported. Chrome is installed by default on Live Capture servers and configured to operate properly. Windows is configured to permit Chrome to update automatically.

You can use Chrome on any workstation or other computer, regardless of the operating system, that supports Chrome.

For optimal viewing of web apps, set your monitor size to 1920 x 1080 or greater.

Efficient Use of Capture Web Apps

When a user is logged into the Capture web applications, the web app consumes network and server resource cycles, particularly while viewing multiple channels. When viewed, each channel connects a thumbnail and preview stream to that instance of the web application. Multiple users connected to the web application can degrade its performance. Therefore, care must be taken to ensure that the Live web apps do not consume resources unnecessarily when not being used.

WARNING: Windows IIS allows for a limited set of web socket connections to applications. Over an extended period, if Capture web apps are opened in multiple browsers, the web server and browser may exceed the connection limit. This results in thumbnails and previews not displaying in the web apps. To avoid this situation, close any browser connected to the Live Capture Portal that are not being used.

Launching Lightspeed Live Web Applications

Note: This topic applies to all Live web apps except the Source Manager web app. For details on launching Source Manager, see *Managing Video Sources*.

Most Lightspeed Live web apps are launched from Vantage's web portal, which requires logging in to Vantage. Logging in to a Vantage domain from a web application is a bit different than logging in from a Vantage Windows client application, such as Workflow Designer.

To start Live Capture | Tape Capture | Live Schedule Pro web applications (or other Vantage client web apps), do the following:

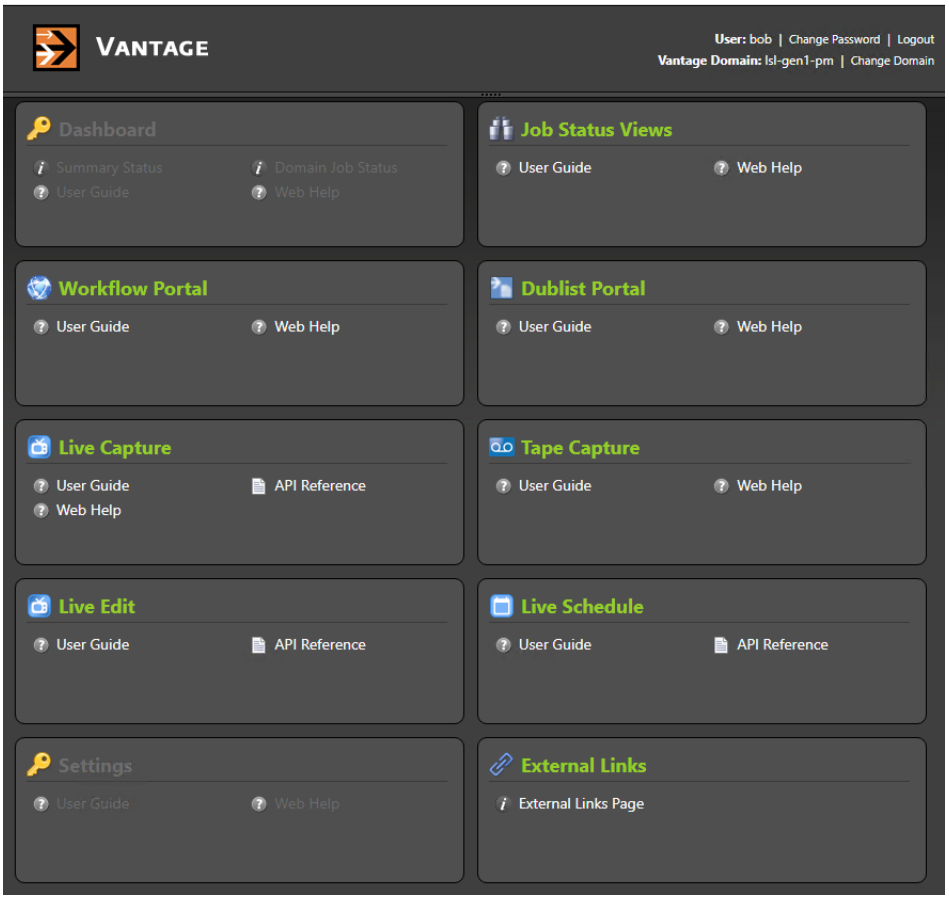
1. Display the Vantage web portal—open Chrome and enter one of these URLs:

   http://`<IISServerName>`*/Vantage* where `<IISServerName>` is the DNS name of the IIS server—by default, the same as the Vantage domain server

   OR

   If you're running Chrome directly on the server which hosts Vantage, enter *http://localhost/Vantage*.

   Vantage displays its web portal (also referred to as the Vantage home page).



Note: If you don't know your Vantage domain's server name (by default, the server where the Vantage domain database is hosted), contact your Vantage administrator / IT department.

2. Click on the panel for the web app you want to launch.
3. If you're prompted to log in to Vantage, enter your credentials.

Note: If you' re not authorized to log in, contact your Vantage domain administrator.

The apps that display in the Vantage web portal vary depending on your licenses. Click the web app you want to use.

The first time you open the Live Schedule Pro web app, you must use the Vantage web portal (*http://localhost* | `<host name>`*/Vantage/)*. This creates a cookie for a persistent connection to the Vantage Live Service. Opening the Schedule web app for the first time directly via the URL bypasses this process, resulting in the error *No client connection to Live server*.

Note: If you are logging into a web app from another workstation on the network, you may encounter a connection error: *No client connection to Live server*. Clear your browser cache and retry, determine if the Vantage Live Service is running and accessible, or go to *http://*`<host name>`*/Vantage* to display the Vantage web portal, and launch your web app there. Also, verify that the web app's port isn't blocked by a firewall (*Firewalls and Blocked Ports Limit Functionality*).

Launching the Source Manager Web App

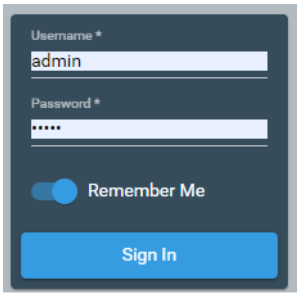
The Source Manager web app (see *Managing Video Sources*) is installed on every Lightspeed Live Capture server.

To start the Source Manager web app and log in, enter *http://localhost:8090/* | *http://* `<Remote host name>` *:8090/* in your Chrome browser.

Note: Unlike Capture, Tape, and other web apps, Source Manager does not utilize the Vantage web portal (*Launching Lightspeed Live Web Applications*) for launching or for managing user credentials. You can modify Source Manager user credentials using the Group Portal (see *User Administration*).

When you are accessing Source Manager locally (Chrome is running on the same Live Capture server as Telestream Live Source Service), use the keyword *localhost*. If you are accessing Source Manager remotely (Chrome is running on a computer that is not a Live Capture server), use the Live Capture server's host name.

Source Manager displays the login panel:



Enter your user name and password. The default user name and password is *admin/live!*. Users are defined using the Groups Portal web app (*User Administration*).

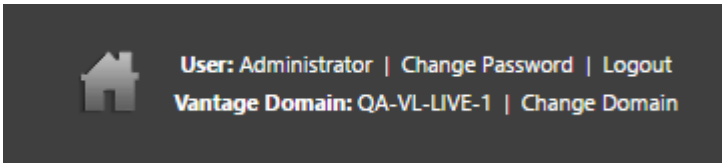
Logging Out of Source Manager

To log out of Source Manager, click the User icon in the toolbar at the top right corner of the window at the far right edge of the Source Manager title bar. Source Manager logs you out and immediately displays the Log In panel.

To log back in, enter your user name and password. The default user name is *admin* and the default password is *live!*, and it can not be altered. You can create additional users in the Group portal (see *User Administration*).

Changing the Vantage Domain Name

If you have changed your Vantage server's host name (by default, it is used to name your Vantage domain), you should verify that the Lightspeed Live Capture web application is using the new domain name. The currently-connected domain name displays in the upper right corner of the web app:



If it is not connected to the correct domain, change the domain with these steps:

1. Click on *Change Domain*.
2. Click OK to log out.
3. Click Search in the dialog that displays.
4. Select the correct domain, and click OK.
5. Enter the user name and password to log into the target domain.

Lightspeed Live Server Resource Requirements

Live Capture uses a variety of codecs and container formats to digitize live video and serialize it into media files. At the simplest level, Live Capture consists of customizable workflow actions that automate the real-time video capture process.

A workflow is the process you create in Vantage that ingests an incoming live source and compresses it using one of many codecs and saves the file using one of many container formats. It utilizes the Vantage Capture action to perform these tasks.

Given the data and computation intensity of multiple, simultaneous processes, care must be taken not to exceed the limits of the Lightspeed Live server's available resources.

General information is provided, as well as model-specific resource usage guidelines.

Note: This chapter provides information to help you calculate Lightspeed Live Capture resource usage when hosted on a Lightspeed Live server—it is not intended for use on VM | cloud-based Live Capture systems.
On VM and cloud-based systems, you should conduct your own performance testing to determine how to configure your system and use it to meet these guidelines.

Topics

Note: CPU utilization should not exceed 75%; 60 percent or less is recommended. Contact Telestream (*Obtaining Support | Information | Assistance*) if you encounter situations where the load is not balanced across both nodes/sockets or exceeds 75%. Also see *Use Source Manager to Manage Affinity Settings* for affinity balancing.

Overview

You should not configure multiple workflows to ingest the same SDI source under normal operation conditions, because they may be executed simultaneously and potentially overloading the system. Instead, source routing should be used to achieve the same result. This source-to-workflow flexibility makes it important to ensure that simultaneous processes being performed on a Lightspeed Live server do not exceed its total processing capabilities.

Every process should be taken into account when determining what resources are required. Processes that materially affect system resources include the primary output codec, secondary output codec and the input video's frame size, video bit depth plus the number of input sources—both SDI and IP-based. Also, the Live web app's preview and thumbnails, and the time shift buffer (if enabled) affect resources.

Keep in mind that the CPU is assigned to a processor group based on which source input is selected. See *Balancing CPU Processor Group Affinities* for details.

Balancing CPU Processor Group Affinities

Live Capture uses the Windows Processor Affinity feature to balance CPU loads, to gain the most efficient CPU usage for capturing live video.

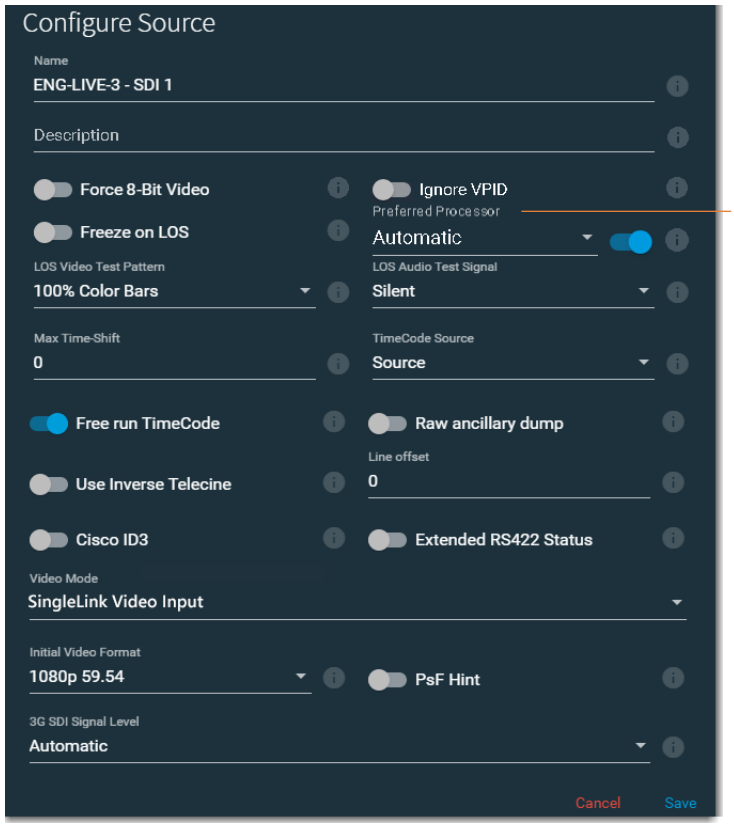
Note: Processor Affinity is enabled for load balancing. On first-generation, C2, or C2+ Lightspeed Live servers (or any system with 64 logical processors or less, such as a VM or Software Only server that performs one recording at a time.), where you can disable processor affinity for SDI sources, the Processor Affinity control allows you to disable Preferred Processor completely, in which case the live source process will try to use both sockets. Generally, you should use Live Capture with this setting enabled.
For IP sources, balance the CPU load manually using the Preferred Processor control. You should disable Processor Affinity only when capturing UHD/4K video, in which case the live source process will attempt to use both sockets.

Live Capture workflows execute capture processes on the processor group (also known as *CPU affinity*) to which the associated source has been assigned.

Live Capture automatically assigns each source affinity to a processor group (Affinity 1 or Affinity 2) at start-up. Although Live Capture alternates CPUs when creating IP sources, you should verify affinity to ensure your sources are equally distributed between sockets.

Use Source Manager to Manage Affinity Settings

You use Source Manager to view and modify all of your source's affinity status and assignment, which is controlled by the Preferred Processor control in the source's Configure Source dialog, as shown here:



To display the Preferred Processor control, enable Advanced Mode in the System Settings panel.

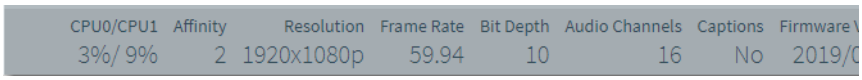
Note: If this control doesn't display, processor balancing on this model server is performed automatically, and no end-user adjustment is available, or advanced mode is disabled (see *Managing System Settings*). Use only when capturing SD/HD SDI sources—disable it when capturing UHD/4K.
This control displays on all server models when Advanced Settings is enabled. The ability to disable Preferred Processor is enabled only on systems with less than 64 logical processors.

Preferred Processor can't be disabled when the server has 64+ processors.

Preferred Processor can be disabled when the server has 64 or less processors.

Care should be taken to ensure that a processor group is not assigned more workflows than it can support. See the Resource Utilization tables later in this chapter for specific processor and codec capacities.

To determine which processor group a given source has been assigned, in Source Manager, make sure Advanced Mode is enabled (*Managing System Settings*). Select a source to view the processor group assignment (in the Affinity column)—as well as CPU utilization—in real time:



Managing Affinity on C1 | C2 | C2+ Servers

C1 | C2 | C2+ Lightspeed Live servers have two separate CPU processor groups. When enabled, processing associated with each Capture | Tape job is assigned to the assigned CPU on the server's multi-core CPU to prevent inefficient process mapping across CPU sockets during heavy loads, typically when several sources are capturing concurrently.

You can manually set affinity to a specific socket for any source type on any model. If you create IP sources in order and use them in order, balancing is automatic. However, for example, if you delete every other IP source, the remaining sources do not balance and you can use this control to balance them. If IP sources are maintained long term, it may be helpful to assign each source a preferred processor.

For both source types—dynamically created sources (IP sources) and permanent sources (SDI sources)—it is possible to delete dynamically created sources in a way that leave the remaining sources unbalanced.

Disabling this option during multi-source capturing may result in excessive CPU usage. When Preferred Processor is disabled, affinity is set to 0.

On a C2+ Lightspeed Live server, with advanced mode enabled (*Managing System Settings*), you can disable manual affinity completely—disable the Preferred Processor control in the Configure Source dialog. When you disable Preferred Processor, the Live Source process will attempt to use both sockets.

Managing Affinity on C4 | C5 Servers

On a C4 or C5 server, you can manually set affinities when required for IP sources.Processor affinities should be balanced for optimal utilization. Generally, SDI 1 | 3 | 5 | 7 are assigned an affinity value of 1. SDI 2 | 4 | 6 | 8 are assigned affinity 2.

Balancing affinities is generally automated. SDI affinities—set automatically. When you dynamically create sources, you typically don't need to adjust affinities in order and use them. However, if you delete alternate IP sources, for example, you may be left with sources that do not balance.

Affinity for a given source is set zero (0) when Preferred Processor is disabled for the source.

When performing 4 concurrent captures, they should be balanced across processor arrays. For example 1, 2, 3, 4 or 5, 6, 7, 8 are balanced across affinity groups. 1, 3, 5, 7 or 2, 4, 6, 8 aren't balanced, because they are assigned the same affinity group and thus, will saturate the resources of the CPU processor group.

On a C5 server, when you are capturing 6 10-bit sources, you should use all four SDI ports of the first SDI card and two of the second. The last two ports of the second card remain unused. These two unused sources should be alternating affinities to maintain balance in the rest of the sources.

Note: CPU utilization should not exceed 75%; 60% or less is recommended.

For more details, see *Source Information and Statistics Panel* and *Maximum Concurrent Captures*.

Processes & Factors Affecting Performance

These processes and factors materially affect system resources:

Primary Output Codec

The Primary Output codec may utilize the CPU or GPU for encoding. It is the most resource intensive component. See the codec charts below for general information on CPU utilization.

Secondary Output codec

The specified Secondary Output codec, like the Primary Output codec, may utilize the CPU or GPU for encoding, and uses the CPU for video processing library operations such as spatial formatting and interlacing. It is the second most resource intensive component.

Codec/Source Input Bit Depth

It is considered best practices to match the selected codec's bit depth to the bit depth of the source input. For example, DNxHD HQX is a 10-bit codec. Set the associated source input to 10-bit in order to avoid additional processes to convert the incoming frames to match the codec's bit depth.

In contrast, DNxHD SQ is an 8-bit codec, so you should use it only on 8-bit source, in order to obtain the most efficient resource usage.

ST 2110 Source Bandwidth Limits

Live Source manager does not impose a limit on the number of ST2110 sources, but there are practical limits you should consider. The primary limit on the number of ST 2110 is imposed by the CPU and disk write speed of the Live Capture server. It is also possible to overload network bandwidth with connections to live source receivers.

Consider as a starting point, that the data throughput for a 1080p 59.94 10-bit video source is about 3 Gbps. A 25Gbe NIC can support approximately 8 of these connections: 25 Gbps / 3 Gbps = 8 sources. Exceeding this limit will result in an unstable connection inducing packet loss.

For a 100Gbe connection, the theoretical maximum concurrent live sources is 100 / 3 = 33 from the perspective of network sustainability.

Live Capture Web App

Using the Live Capture web app directly on a Lightspeed Live server adds to the resource load. This fact must be taken into account when capturing multiple channels concurrently. For details, see *Live Capture Web App*.

Telestream recommends that you connect to the Live web applications from browsers running on client workstations and you do not run them directly on a Lightspeed Live server. This avoids additional decoding load for the Live web app's preview directly on the server.

Determining the Time-Shift Buffer Duration

The Time-Shift buffer in Live Capture has a maximum duration of 10 seconds for each source. The memory used by each instance of the Time-Shift buffer is directly related to the frame size and frame rate of the source video.

Note: For more details about the Time-Shift buffer, see Creating Live Capture Workflows, in the Live Capture User Guide.

Use this data as a baseline when determining the duration of each source's time-shift buffer:

Standard Definition (SD) Codecs

- **NTSC and PAL**—The total for all (maximum 8 SD sources) source Time-Shift buffers combined should not exceed 80 seconds.

High Definition (HD) Codecs

- **720p/1080i /1080p up to 30fps**— The total for all Time-Shift buffers combined should not exceed 80 seconds.
- **720p/1080p above 30fps**—The total for all Time-Shift buffers combined should not exceed 60 seconds.

UHD/4K Codecs

- The total for all (maximum 2 UHD/4K sources) Time-Shift buffers combined should not exceed 20 seconds.

Capturing Uncompressed Media Via SDI

Live Capture hosted on a Lightspeed Live server can capture Uncompressed SD | HD |UHD/4K in 8- or 10-bit via SDI. Several factors (both platform- and media-based) determine capture limits.

- Storage Location—Local media drive or shared storage (NAS | SAN).
- Drive Configuration—The drive configuration is governed by the number of drives in your Live Capture server's media drive and the RAID type. A standard Live Capture server ships with a media drive containing 4 drives striped as RAID 5. In addition, the media drive can be expanded to 8 drives by purchasing Media Drive Option LS-LIVE-4TB-OPTION. The RAID type of the media drive can be changed from RAID 5 by the end user to RAID 0 if disk I/O is more important than data redundancy. See *Rebuilding the Lightspeed Live Storage RAID*.
- Frame Size | Frame Rate | Scan Type—The incoming source frame size, frame rate, and scan type (interlaced (i) | progressive (p)) affects the requirements for capturing and generating an uncompressed output file.

Maximum Concurrent Captures

Use this table to determine the resource requirements for capture workflows executing concurrently on a Lightspeed Live server, based on the codec and profile you've specified in the Capture action. When ingesting multiple concurrent feeds, the CPU load is automatically balanced across both NUMA nodes/CPU sockets.

Caution: You shouldn't route more than six 10-bit, 59.94 SDI sources to a server, whether you're capturing them or not—over time, it degrades performance. If all 8 sources are 1080p 59.94 progressive, two of them should be switched to Force 8-bit or they should be a lower frame rate than 59.94 FPS.

Codec and Profile	Max. Concurrent Captures per Server			
	C2	C2+	C3	C4/C5
UHD/4K				
JPEG2000 YUV 10-bit lossless		1 up to 30p	1 up to 30p	2 up to 30p
JPEG2000 YUV 10-bit lossy		1 up to 30p		1 up to 30p
Sony XAVC Long QFHD Class 100			1 up to 30p	2 up to 30p
Sony XAVC Long QFHD Class 200				2 up to 30p
Sony XAVC Class 300 (4K/UHD)		1 up to 30p (CBG | VBR 1 up to 60p (CBG only)	2 up to 30p	2 up to 60p
Sony XAVC Class 480 (4K/UHD)		1 up to 30p (CBG | VBR)	2 up to 30p	2 up to 60p (CBG only)
Avid DNxHR 4K/UHD up to HQX		1 up to 30p	2 up to 30p	2 up to 60p
Apple ProRes 422 4K/UHD SQ		1 up to 60p	2 up to 60p	2 up to 60p
Apple ProRes 422 4K/UHD HQ		1 up to 60p	2 up to 30p	2 up to 60p
x264 4K/UHD		1 up to 30p	2 up to 30p	2 up to 30p
x265 4K/UHD		1 up to 30p	2 up to 30p	2 up to 30p
XAVC QFHD Long Class 100			1 up to 30p	2 up to 30p
XAVC QFHD Long Class 140				
XAVC QFHD Long Class 200		1 up to 30p		2 up to 30p
HD 1080p @ 59.94				
AVC-H.264	2	4	4	6
Panasonic AVC-Ultra 25	2	4	4	6
Panasonic AVC-Intra 50	2	4	4	6
Panasonic AVC-Intra 100	2	4	4	6
Panasonic AVC-Intra 200	2	4	4	6
Sony XAVC Class 100 (HD)	2	4	4	6
Sony XAVC Long Class 50	2	4	4	6
HEVC	2	4	4	6

Codec and Profile	Max. Concurrent Captures per Server			
	C2	C2+	C3	C4/C5
Avid DNxHD up to HQX	2	4	4	6
Apple ProRes HD 444	2	4	4	6
Apple ProRes 422 HD up to HQ	2	4	4	6
Sony XAVC Class 100	2	4	4	6
x264 HD - Baseline, Main, High (8-bit)	2		4	6
x264 HD - High 10, High 422(10-bit)		4	4	6
x265 HD - Main10	2	4	4	6
JPEG2000 YUV 10-bit lossless		2	1	2
JPEG2000 YUV 10-bit lossy		2	1	2
HD 1080i @ 29.97				
Sony XDCAM 420/422 (8-bit)		4	8	8
DVCProHD		4	8	8
HD 1080i @ 59.94				
Sony XDCAM 420/422 (8-bit)	2		8	8
DVCProHD	2		8	8
JPEG2000 YUV 10-bit		2	2	4
HD 1080p @ 29.97				
Avid DNxHD 444	2		6	6
Panasonic AVC-Ultra 50			4	6
Panasonic AVC-Intra 50	2		8	8
Panasonic AVC-Intra 100	2		8	8
Panasonic AVC-Intra 200	2		8	6
SD NTSC				
IMX	2	4	8	8
DV/DVC Pro	2	4	8	8

Maximum Concurrent Captures for VM-based Live Capture

A Live Capture Software system requires one license per concurrent capture, for a maximum of four licenses per VM. If a single license is active but multiple Capture workflows are active, you can not start a capture operation. See Software-Only Licensing for licensing details.

Connecting VTR Systems

This chapter describes connecting VTR units to a Lightspeed Live Server using the optional 4-port USB-to-RS-422 VTR Interface Kit (purchased separately) so that you can control them with the Tape web app.

The 4-port RS-422 VTR Interface Kit enables you to connect up to 4 VTRs to the Lightspeed Live Server. The VTR Interface Kit muxes and passes multiple RS-422 port connections through a single USB cable, connected to the Lightspeed Live Server.

To support 8 VTRs you can use two 4-port VTR Interface Kit.

Note: Before you can capture video from a VTR, the system must be set up and configured (*Configuring Vantage and Updating Live Capture*), including a tape capture workflow (*Creating Vantage Capture Workflows for Live and Tape Media*).
Use of the Tape Capture web app is described in *Capturing Tape Media*.

Topics

4-Port Interface Kit Components

The *4-Port RS-422 VTR Interface Kit* includes these components:

- One USB-to-RS-422 interface box, pre-mounted, providing four RS-422 serial ports
- One 1R-U rack-mount tray that can hold two RS-422 interface boxes
- One USB cable to connect the RS-422 interface box to the Lightspeed Live Server
- Two sets of RS-422 DB9-to-RJ45 (Ethernet style) adapters:
  - Four Female DB9-to-RJ45 blue adapters to connect to the RS-422 interface box.
  - Four Male DB9-to-RJ45 gray adapters to connect to a VTR.

Note: The blue, female adapters are for server side use; the male gray adapters are for the VTR.

- Rack mount tray mounting hardware (see image below) includes:
  - Four 10-32 rack screws and washers
  - Four G-type cage nuts
  - One small tie-wrap to secure the USB cable to the tray.

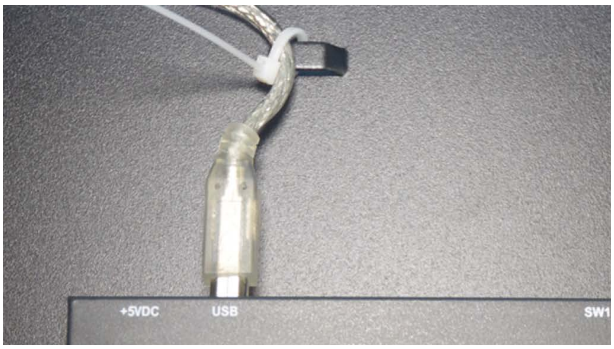
The RS-422 interface box is powered by the Lightspeed Live Server's USB port, so no additional power supply is required. Drivers for the USB-to-RS-422 interface box are included in the software package and are installed as one of the steps below.

Installing the RS-422 Interface Box

The RS-422 interface box and tray should be installed in a rack. It is best installed in the rear of the equipment rack directly behind the Lightspeed Live Server—or directly above or below—to be close to the Lightspeed Live Server USB ports.

To install the USB-to-RS-422 interface box in its rack mount tray, follow these steps:

1. Insert the USB cable into the rear of the RS-422 interface box.
   Fasten the USB cable to the tray by inserting the tie wrap through the raised anchor tab and tighten it to secure the cable.



2. To prepare the tray mounting location, place the four G-type cage nuts onto holes of an open rack space that is close to the Lightspeed Live Server.

3. Install the tray with the supplied screws and washers into the cage nuts.

4. Making sure that the Lightspeed Live Server is off, attach the USB cable to the Lightspeed Server; for a single 4-port box, insert the USB cable into either USB port. For two 4-port boxes, plug box 1 into the lower USB port to support VTRs 1-4; plug box 2 into the top USB port for VTRs 5-8.

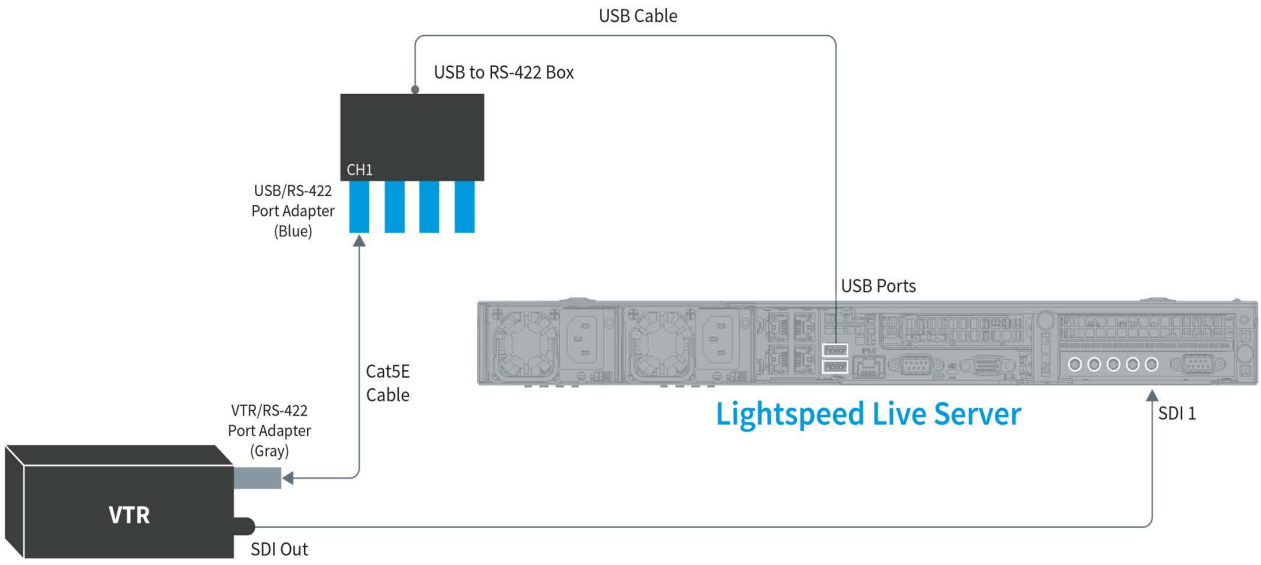
Do not turn on your Lightspeed Live Server yet. Proceed to *Connecting a VTR to the Lightspeed Live Server*, following.

Connecting a VTR to the Lightspeed Live Server

If you have a single VTR, you should connect it (RS-422 and SDI) through the box to the Lightspeed Live Server on the first port. For example, connect the VTR's RS-422 port to Channel 1 (CH1) on the RS-422 interface box and then connect the VTR's SDI Out to SDI 1 on the Lightspeed Live Server.

For multiple VTRs, you must plug VTR1 into RS-422 and SDI Port 1, VTR2 into RS-422 and SDI Port 2, etc.

Note: The backplane of the Lightspeed Live Server has two USB ports. When using two 4-port RS-422 boxes to support up to 8 VTRs, connect the bottom USB port to the 4-port RS-422 box supporting VTRs 1 through 4 and the top USB port connects to a second 4-port RS-422 box supporting VTRs 5 though 8.



To make the connections for each VTR, follow these steps:

1. Turn off the VTR and the Lightspeed Live Server.
2. Position or install the VTR(s) in a safe and convenient location co-located near the RS-422 box and the Lightspeed Live Server.
3. If you are using RJ45 cables for control, attach the gray, male DB9-to-RJ45 adapter to the RS-422 terminal on the VTR.

Note: If an RS-422 router is between the RS-422 interface box and the VTR, the male DB9-to-RJ45 gray adapter should be plugged into the router on the Lightspeed Live Server side of the system.

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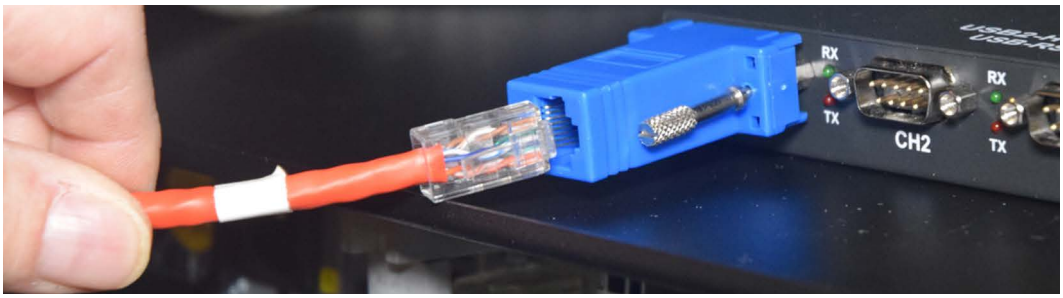
4. To prepare for VTR connection, If you are using RJ45 cables for control, attach a female DB9-to-RJ45 blue adapter to the Channel 1 (CH1) RS-422 serial port on the

interface box. Attach additional DB9-to-RJ45 blue adapters to other channels if you plan to connect more than one VTR.

Connect a user-supplied serial cable into the RS-422 port or Cat5E (or higher) cable into the RJ45 jack on the adapter connected to the VTR. A Cat5E (Cat5 Enhanced) cable is recommended; a straight-through pin-to-pin type (not a cross-over cable) is required. The maximum cable length is 100 meters (328 feet).

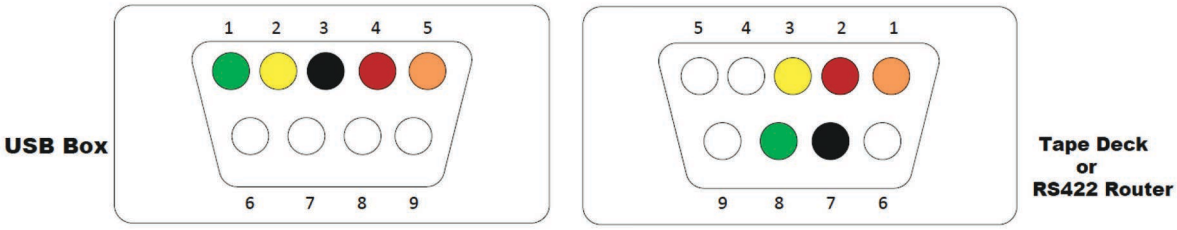


5. Connect the other end of the Cat5E cable into the DB-9 connector or RJ45 jack on the adapter connected to the RS-422 interface box, on the terminal number that corresponds to the SDI source (input) number you want to use on the Lightspeed Live Server.
6. Connect an SDI cable to the SDI Output terminal on the VTR.
7. Connect the other end of the SDI cable to the SDI input terminal on the Lightspeed Live Server that corresponds to the same terminal number you connected to on the RS-422 interface box.
8. Power up the VTR and switch it into the proper Remote mode for RS-422 control.
9. To establish serial communication, the RS-422 Interface Box must be initialized in the Vantage Live Service on the Capture server.
10. To initialize the device, make sure that it is plugged into a USB port and re-start your Live Capture server.

When all connections are complete between the VTR, the RS-422 interface box, and the Lightspeed Live Server, the VTR connection is initialized and CH1 (Channel 1) of the RS-422 interface box automatically synchronizes with SDI 1 on the Lightspeed Live Server, and similarly for all other VTRs.

RS-422 Connector Pin Assignments

Use this pin assignment diagram if you have to create custom RS-422 cables for your USB-RS-422 interface box.



Pin 1 = TX-
Pin 2 = TX+
Pin 3 = RX+
Pin 4 = RX-
Pin 5 = Ground
Pin 6 = N/A
Pin 7 = N/A
Pin 8 = N/A
Pin 9 = N/A

Pin 1 = Ground
Pin 2 = TX-
Pin 3 = RX+
Pin 4 = N/A
Pin 5 = N/A
Pin 6 = N/A
Pin 7 = TX+
Pin 8 = RX-
Pin 9 = N/A

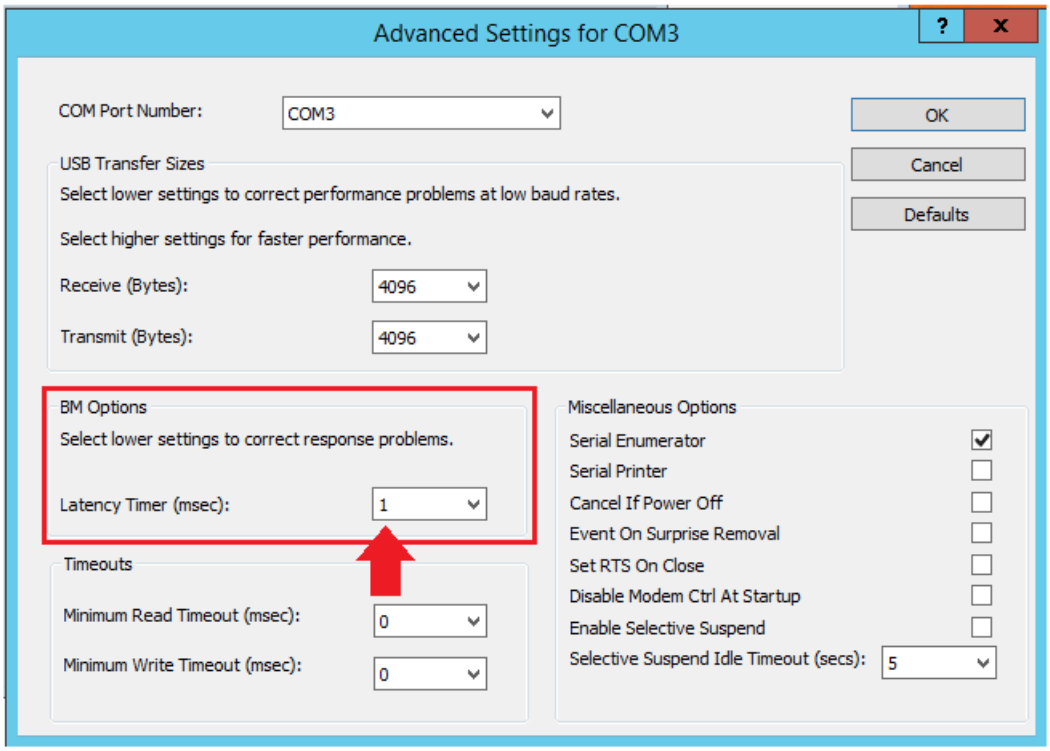
Configuring RS-422 Port Latency Time

The RS-422 port's latency is set at 1 msec by default. However, if new drivers are installed or a new USB-to-RS-422 interface box is used, the latency value may not persist and should be reconfigured to 1 msec or other value as required.

Note: The COM port number typically starts with 3 for VTR connections because COM ports 1 and 2 are permanent and reserved. Therefore, VTR1 is typically COM port 3; VTR2 is 4, VTR5 is 7, etc.

Follow these steps to set each USB Serial Port's Latency Timer value to 1 msec:

1. Open Device Manager on the Lightspeed Live Server.
2. Click on Ports > USB Serial Port.
3. Select the first USB Serial Port, right-click and select Properties.
4. Select the Port Settings tab and click Advanced:



5. Change Latency Timer to 1 msec and click OK.
6. For multiple VTRs, repeat steps 3, 4 and 5 for the remaining USB serial ports.
7. Click OK to update and close the Device Manager.