Alchemist Live IP

User Guide

Version History

Date	Version	Release by	Reason for Changes
21/06/2019	1.0	Jon Metcalf	Initial release – V2.0.0.50
19/08/2019	1.1	Jon Metcalf	Added note on Orbit
25/11/2019	1.2	Jon Metcalf	Edited IPMI section
12/12/2019	1.3	Jon Metcalf	Update for V2.0.1.14
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***Dolby -** Dolby is a registered trademark of Dolby Laboratories.*

1. Definitions, Acronyms and Abbreviations

Table 1: Table of Terminology

Term	Definition
3G	3G (standardized in SMPTE 424M) consists of a single 2.970 Gbit/s serial link, that is required for the transmission of high frame rate, progressive video content (i.e. 1080/50p, 1080/59p).
BMC	**Baseband Management Controller:** A baseboard management controller (BMC) is a small, specialized processor used for remote monitoring and management of a host system.
Anamorphic	A method of carrying wide screen content, in a comparatively narrower aspect ratio transport.
GPU	**Graphical Processing Unit**. Very efficient, parallel compute engine for advanced image processing techniques.
HDR	**High Dynamic Range**. Is a representation that allows extended dynamic range (darker darks, brighter whites) by means of new transfer functions (EOTF/OETF) and Wide Color Gamut (WCG), which replaces the traditional CRT gamma curve and BT709 colorspace.
IPMI	**Intelligent Platform Management Interface** - is a set of computer interface specifications for an autonomous computer subsystem that provides management and monitoring capabilities independently of the host system's CPU, firmware (BIOS or UEFI) and operating system.
License file	Defines the type & quantity of products available.
License Server	An application that manages product licenses.
License Lock Code	The Lock Code based on specific locking criteria. GV Live product licenses are locked to host machine that the sentinel service is installed on. Since GV Live products are all Turnkey, this will always be the Host Machine.
LLDP	**Link Layer Discovery Protocol:** The Link Layer Discovery Protocol (LLDP) is a vendor-neutral link layer protocol used by network devices for advertising their identity, capabilities, and neighbours on a local area network based on IEEE 802 technology, principally wired Ethernet.
LUT	**Look Up Table:** LUT is a term used to describe a predetermined configuration for a specific HDR/Colorspace transform.
Multicast IP	Multicast IP is a method of sending Internet Protocol (IP) datagrams to a group of interested receivers in a single transmission. It is the IP-specific form of multicast and is used for streaming media and other network applications. It uses especially reserved multicast address blocks in IPv4 and IPv6.
NMOS	**Networked Media Open Specification:** is an IP bridge application enabling easy discovery and routing of NMOS supporting systems on a common network.
NTP	**Network Time Protocol:** is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks. NTP is intended to synchronize all participating computers to within a few milliseconds of Coordinated Universal Time (UTC).
Orbit	A GV generic remote control application.
Ph.C	**Phase Correlation**: GV's advanced motion estimation algorithm.

Term	Definition
PhC Protect Areas	A defined area of the processed picture that is not subjected to the PhC conversion algorithm, but instead will drop back to a linear algorithm. Fixed objects like logos or static text, can be protected from possible breakup that can be caused by the PhC conversion process.
PTP	**Precision Time Protocol:** is a protocol used to synchronize clocks throughout a computer network. On a local area network, it achieves clock accuracy in the sub-microsecond range, making it suitable for measurement and control systems.
RollCall	GV's generic remote control application.
GV Live Agent	Virtual software instantiation which adopts a product type to perform a particular media processing function.
GV Live Host	Host software application which manages one or more GV Live agents.
SDR	**Standard Dynamic Range**: describes images/rendering/video using a conventional gamma curve and therefore presenting a dynamic range that is considered standard.
SNMP	**Simple Network Management Protocol:** Is an Internet Standard Protocol for collecting and organizing information about managed devices on IP networks and for modifying that information to change device behaviour.
Synchro	An Alchemist Live conversion mode, where conversion is achieved by a process of either repeating, or dropping source frames. No picture building is performed.
Trap (SNMP)	**SNMP Traps** are alert messages sent from a remote SNMP enabled device to a central collector.
UHD	**Ultra High Definition:** a 4K video format of a specific spacial resolution: 3840x2160
VPID	**Video Payload Identifier:** packets to describe the video format, in accordance to SMPTE 352. VPID information is employed by Alchemist Live for the automatic detection of incoming quad-link format: 2SI or Square Division.
WCG	**Wide Color Gamut.** ITU-R BT.2020 works together with the HDR functionality to offer a much wider color gamut than the traditional BT.709.

2. Introduction

Alchemist Live IP offers the very best motion compensated frame rate conversion for Live IP media streams.

Supporting **SD, HD, 3G, UHD, 4K** and **HDR** Alchemist Live provides transparent, artefact free conversion enabling seamless global distribution of live media.

Alchemist Live consists of software architecture combined with state of the art COTS hardware to offer GV's industry leading frame rate conversion quality in a 4U turnkey solution.

Alchemist Live offers native support for a single channel of UHD/4K, or three channels of up to 3G resolution, making it the most flexible solution available today. In addition, a suite of HDR processing tools are included enabling real-time conversion of SDR to HDR, HDR to SDR and HDR to other HDR formats.

The control interface for Alchemist Live is GV's generic RCP (RollCall Control Panel) which can be run either from RollCall, or via GV Orbit. RollCall Lite is available as a free download. Alternatively, there is also an HTML5 web service available.

Alchemist Live runs on the GV Live software framework. This software architecture is the common platform for all the products in the GV Live product portfolio. It consists of a Host software application which manages software agents. Agents adopt a product type based on licenses installed.

For Alchemist Live, an agent represents a channel of process. In single channel UHD/4K mode one Agent will be running, and in three channel 3G mode, three Agents will be running.

3. System Requirements / Prerequisites

The control surface for Alchemist Live can be either:

- Orbit.
- RollCall RCP (RollCall Control Panel).
- HTML5 web service

GV Orbit:

The Orbit Lite control application is available as a free download from the GV Website here:

GV Orbit Download

(Follow the links to the Download section. A login will be required. Customers without a login can register via the website)

At the time of writing, the latest GV Orbit Suite version is: V5.3.0

Orbit should be installed on a remote PC either running Windows 7 or Windows 10.

RollCall Control Panel is available within the Orbit application.

RollCall RCP:

RCP (RollCall Control Panel) is a component part of the RollCall application. RollCall should be installed on a remote Windows computer.

At the time of writing, the latest RollCall Suite version is: V4.19.8

RollCall Lite, of which RCP is a component part, is available as a free download from the GV Website here:

RollCall Download

Note: there must be an IP network connection between the PC running RCP and the Alchemist Live.

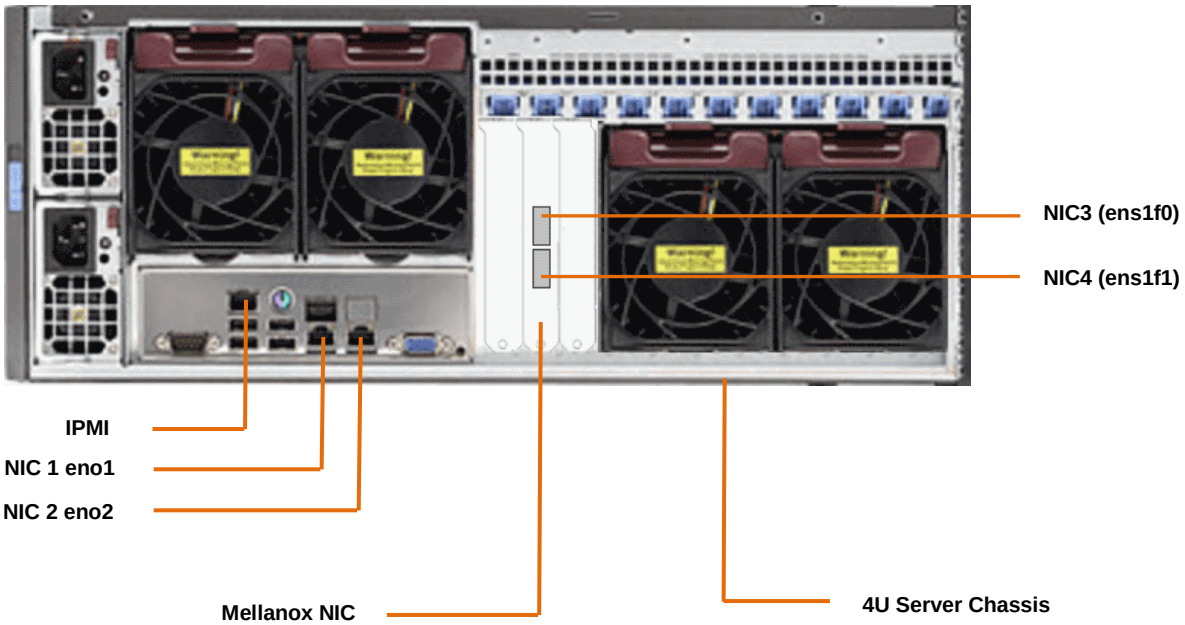
The default IP address on NIC 1 is 192.168.0.1 (see Appendix A for more details).

Note: this manual demonstrates control via RCP. However, Orbit templates are virtually identical to those of RollCall RCP.

HTML5 Web Service: added in V2.0.1.14, Alchemist Live may be controlled via an HTML5 Web service. This can be run directly from a Chrome, Mozilla Firefox, etc, running on either Windows, or Linux, or Safari running on an Apple Mac.

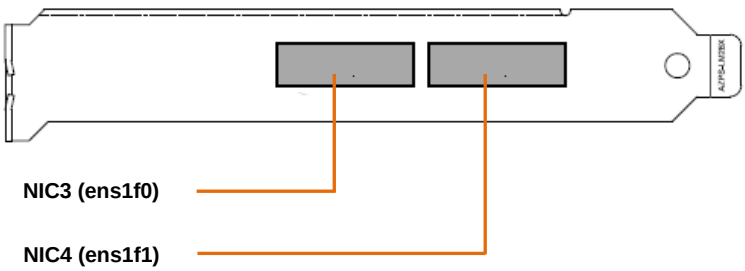
See **Appendix C** below for more details.

3.1 Alchemist Live Hardware



The Alchemist Live Turnkey is based on a generic COTS Server enclosure.

IP interface PCIe card



The network card used is a Mellanox MCX516A-CDAT 100GbE Dual Port PCIe.

4. GV Live Architecture

The **GV Live** software consists of a **Host**, **Agent** and **License Server**.

The **GV Live Host** manages the **GV Live Agents**. Typically there would be one host per physical compute instance. From a RollCall perspective, the **GV Live Host** can be considered as a virtual IQ frame.

GV Live Agents are spawned by the Host and adopt a product type based on the nominated product license. Each agent has its own unique RollCall address just like a module would in a frame and can therefore be considered as a virtual slot.

The **License Server** is the local daemon that manages the product license(s). The daemon must be present upon start-up for successful use of the product. If for any reason the license disappears there is a 24 hour grace period before the product will stop working.

5. Installing RollCall Control Panel (RCP)

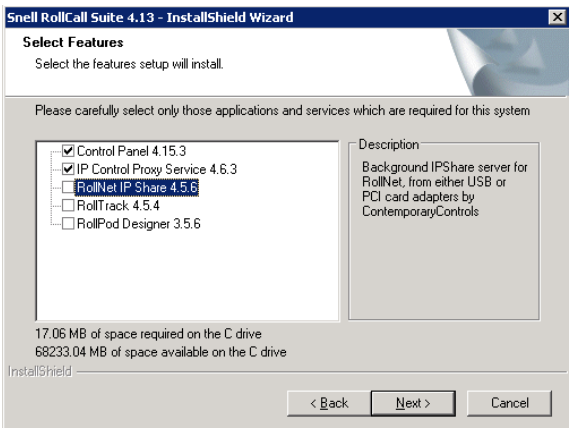
The Alchemist Live IP does not have a dedicated control interface, but instead utilizes RCP.

Note – this guide is not a RollCall tutorial.

RCP is the control application for the GV product range and is available to GV customers free of charge. RCP will need to be installed on a remote Windows PC with a network connection to the host machine.

Installation is very easy. Just launch the RollCall Suite Installer and follow the Install Wizard. Note that part way through the install process, it will be asked which RollCall components are to be installed. All components can be install if desired, but from an Alchemist Live IP perspective, the important components are:

- **Control Panel**
- **IP Control Proxy Service**



Follow the RollCall installer wizard to complete the process.

Once installed, control of GV Live products is possible using Control Panel. It is recommended to use Control Panel via IP Proxy service.

6. Using RCP via IP Proxy Service

6.1 Configuring RollCall Proxy

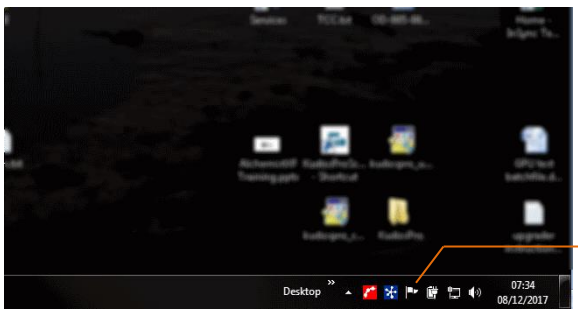
The following procedure will describe how to set up RollCall IP Control Proxy Service on a remote PC, on the same network as the GV Live host machine.

Note: the advantage of using the IP Control Proxy Service is that control of multiple GV products can be managed from a single RollCall Control Panel session, without the need to keep changing the connection IP Address. By using IP Control Proxy Service, Control Panel can be set to **Localhost** and all devices configured in the IP Control Proxy Service will be visible in the connection pane of Control Panel.

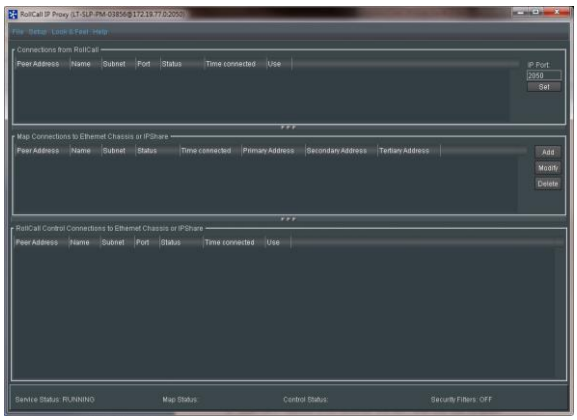
In this example, the GV Live application is configured in RollCall Proxy:

1. On the remote PC, where RollCall has been installed, note the RollCall launch icon present on the task bar.

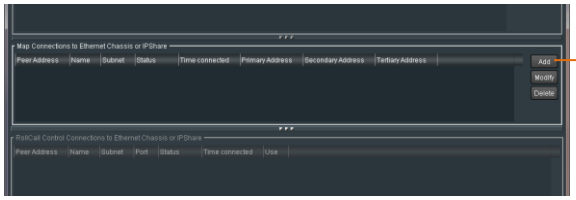
   Note: if it is not visible, go to: **Start/All Programs/Snell** and the RollCall Proxy application can be picked from the listed RollCall components.



Launch RollCall Proxy. The **RollCall IP Proxy** window will open:

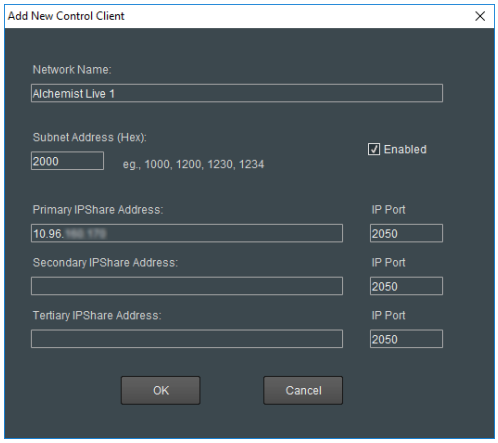


2. In the **Map Connections to Ethernet Chassis or IP Share** pane, select: **Add**.



The **Add New Control Client** window will appear:

3. Populate the **Add New Control Client**:



In this example, the Alchemist Live has been given the Network Name:

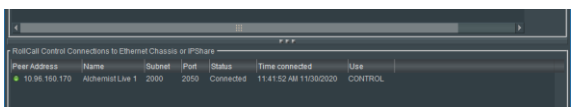
Alchemist Live 1

This unique name will enable it to be easily identified should multiple Alchemist Live systems be configured in RollCall Proxy

- The **Network Name** is usually an intuitive name that will allow easy identification of the device within the **Map Connections to Ethernet Chassis or IP Share** pane.
- The Subnet address needs to be set. The actual hex value set isn't important, as long as it's unique. If the Alchemist Live is the first item configured into RollCall Proxy, use the hex address **1000**. If it's the second, use hex address 2000 (assuming 1000 has already been used). In this example, it's been set to **4000**.
- Enter the **Primary IPShare Address.** This is the IP Address of the Alchemist Live host machine. If this is not known at this point in time, see **Section 10.2.2** below.

Click **OK.**

The configured Client will now appear in the **Map Connections to Ethernet Chassis or IP Share** pane.

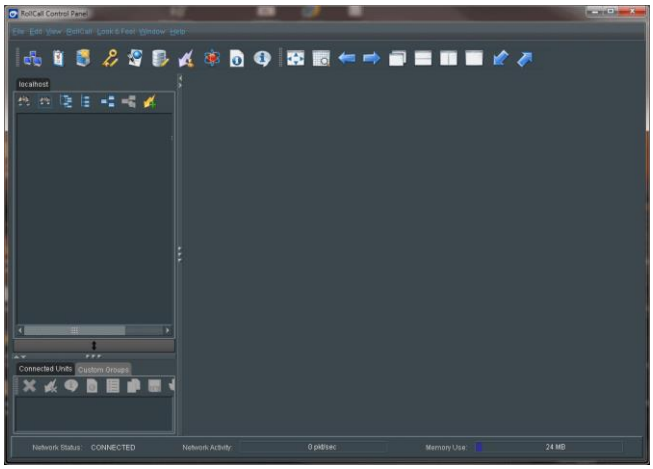


Note: items will only appear in the **RollCall Control Connections to Ethernet Chassis or IP Share** pane, once RollCall Control Panel has been started.

6.2 Connecting to Alchemist Live using RCP

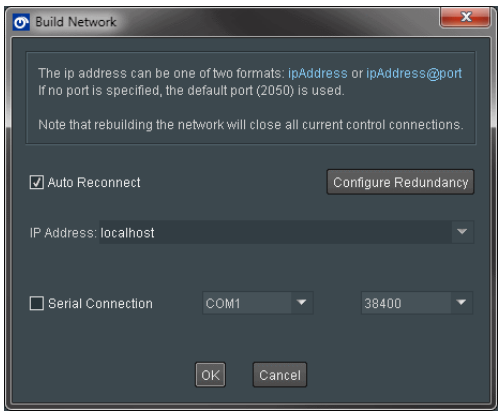
1. On the remote PC, open **RollCall Control Panel**, via the desktop icon:

The RollCall Control Panel will open:



2. Click on the **Connection** icon:

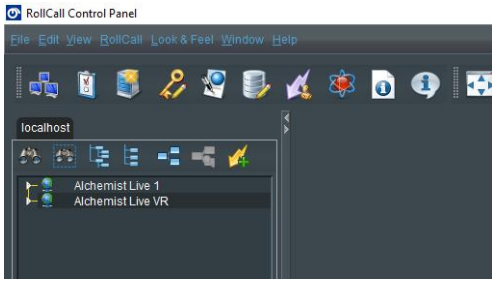
The **Build Network** Window will now appear:



The IP Address will default to: **localhost.** This is the required setting. If the IP Address is set to anything else, set it to **localhost.**

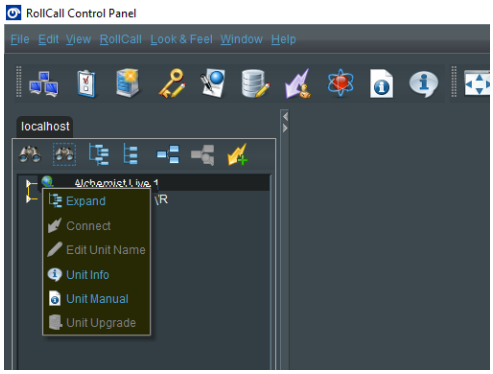
Select **OK.**

3. **Alchemist Mainframe** will now appear in the RollCall connection pane:

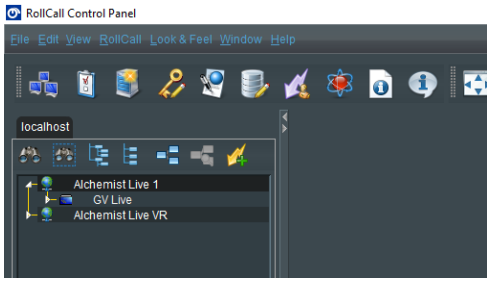


4. Right click on **Alchemist Live 1.**

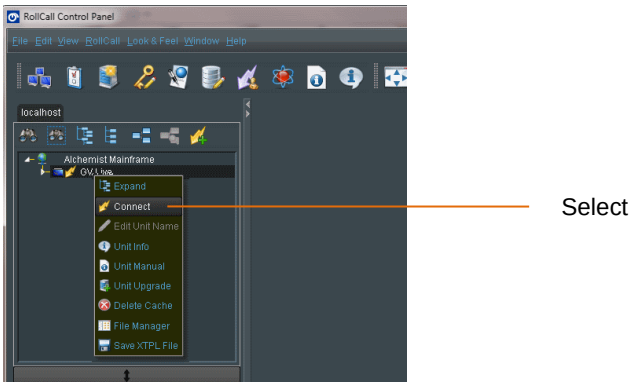
   A drop-down list will appear. Select **Expand**.



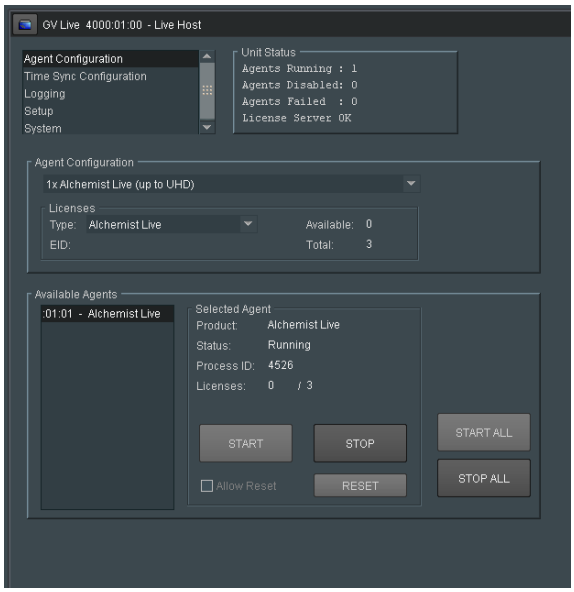
   GV Live will now appear:



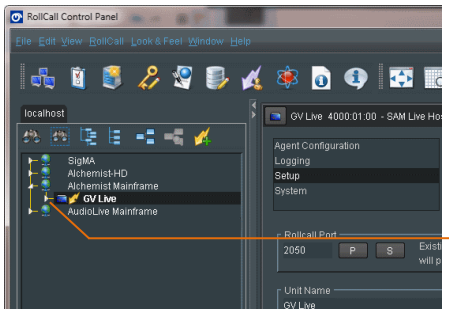
5. Right click on **GV Live.** A drop-down list will appear. Select **Connect.**



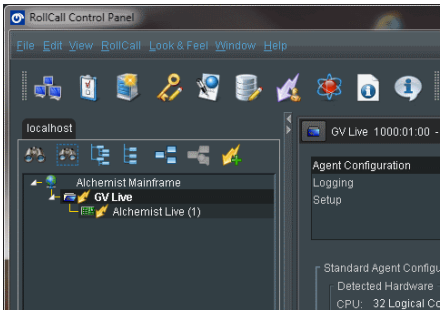
The **GV Live Host** template will now load.



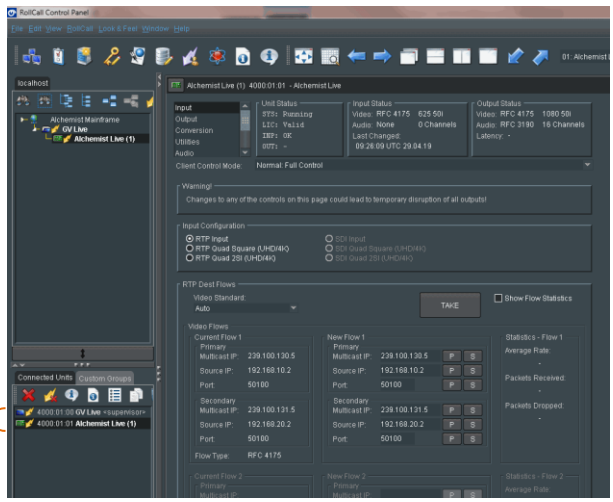
6. In the RollCall Connection pane, expand the tree by selecting the small white arrow to the left of the GV Live icon:



Alchemist Live (1) will appear:



7. Double click on the **Alchemist Live** listing and the Alchemist Live RollCall Template will load:



Both the **GV Live** and **Alchemist Live** templates are now loaded and maybe configured.

Confirmation of the loaded templates is shown under the **Connected Units** tab.

It is possible to quickly change between templates, by simply clicking on the required template, in the **Connected Units** tab.

7. Using RCP in Orbit

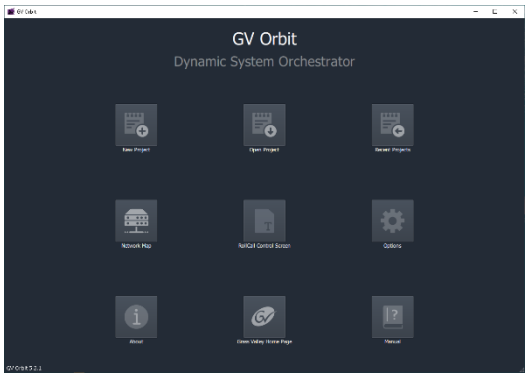
RCP can be run as a component of Orbit.

Note that the full Orbit product is a GV paid-for Automated Control and Monitoring application. For customers who already own Orbit, RCP can be run as a component within Orbit.

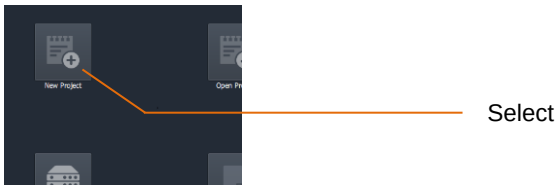
Orbit Lite is available as a free download. Orbit Lite also includes RollCall Control Panel and may be used to control Alchemist Live.

Procedure

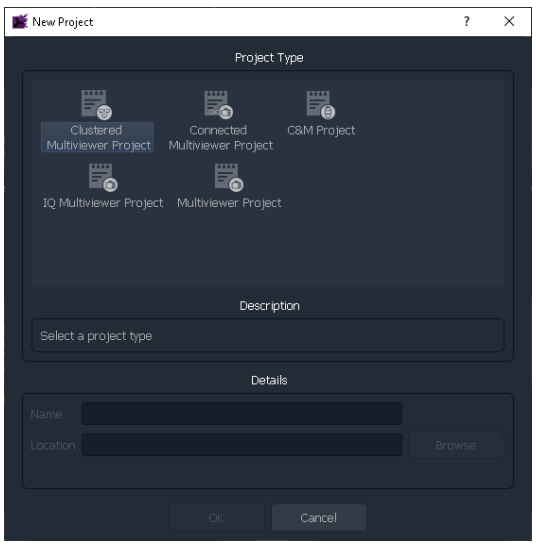
1. Open the Orbit control panel.



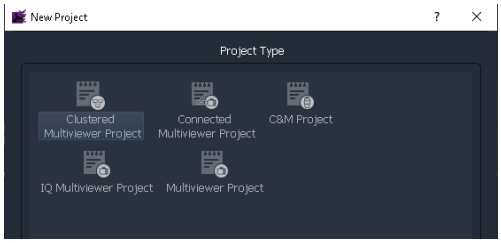
2. Select the **New Project** button:



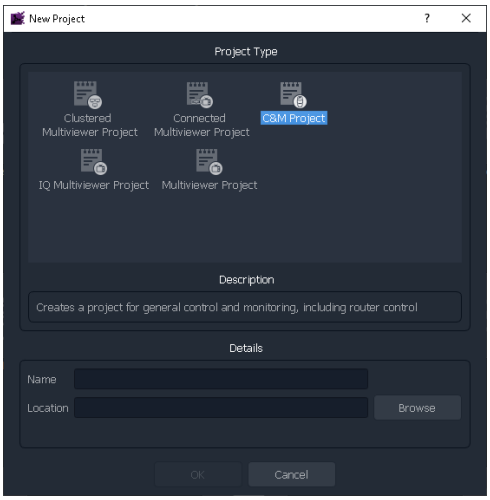
A new window will open called **New Project**



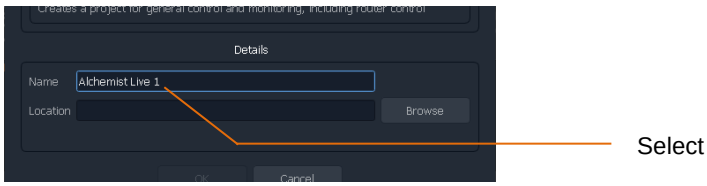
3. In the Project type pane, select **C&M Project**



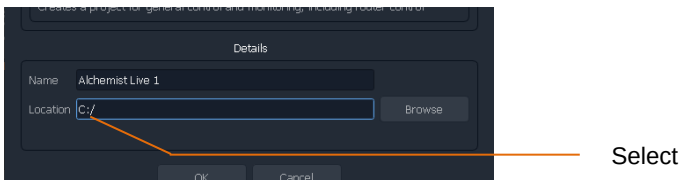
The New Project Window will update:



4. Enter a name for the new C&M Project. This can be anything the User chooses, but should be something to make future reference easier.

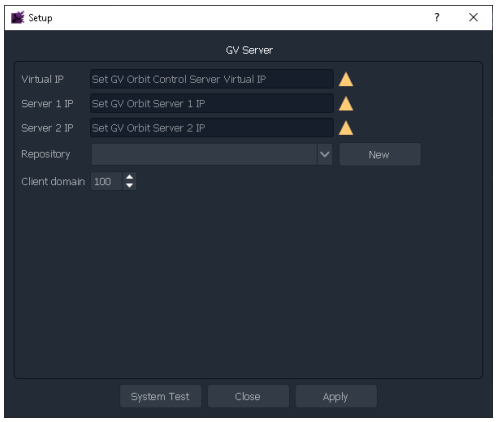


5. Enter a location where the new C&M Project is to be stored. The URL path can be entered manually, or by use of the Browse button:



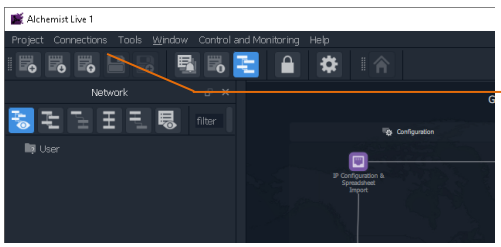
In this example the location is the root directory C:

Click OK. This will prompt a new window called Setup to appear:



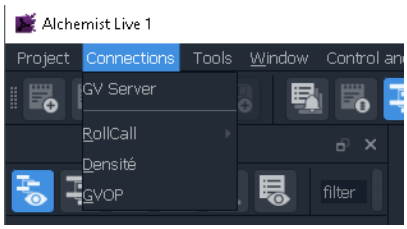
This can be simply closed.

6. At the top of Orbit Client, click on **Connections**

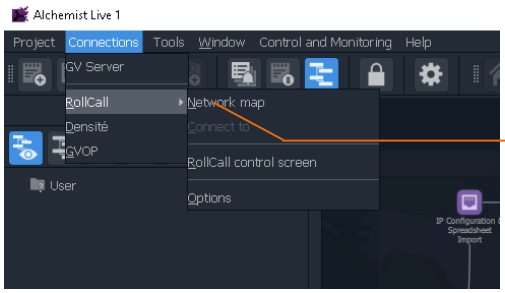


Select

Clicking **Connections** will expose a drop down menu:

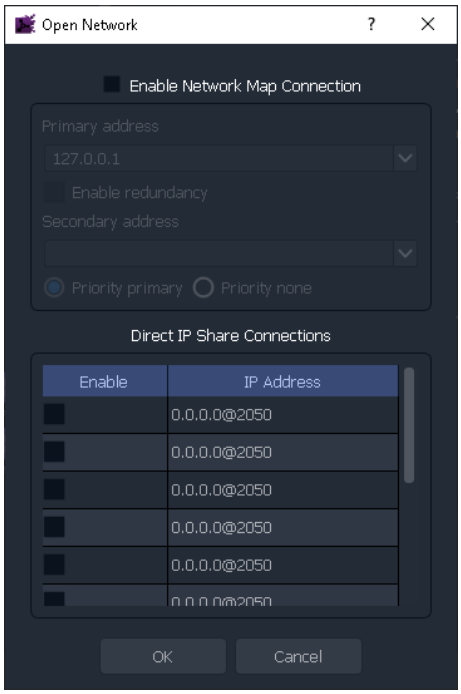


7. In the Connections dropdown menu, select RollCall. This will expose a new dropdown menu:



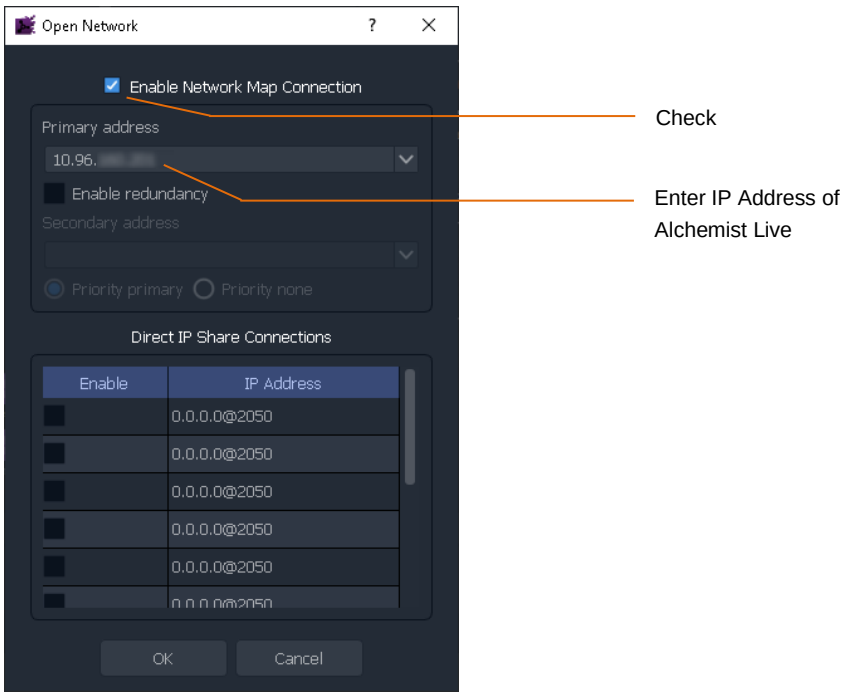
Select **Network Map**

A new window called **Open Network** will appear:

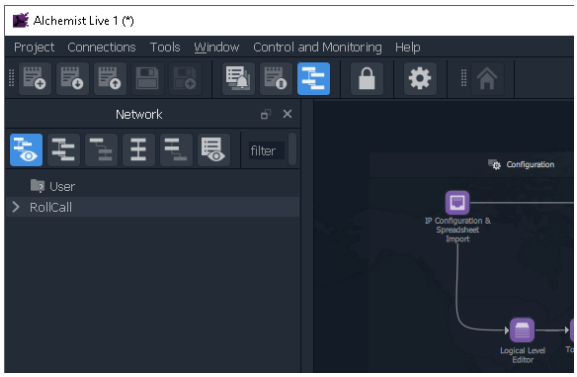


8. In the **Open Network** window, check the **Enable Network Map Connection** checkbox.

   This will make the **Primary address** field active. Enter the IP Address of the Alchemist Live that is to be controlled:

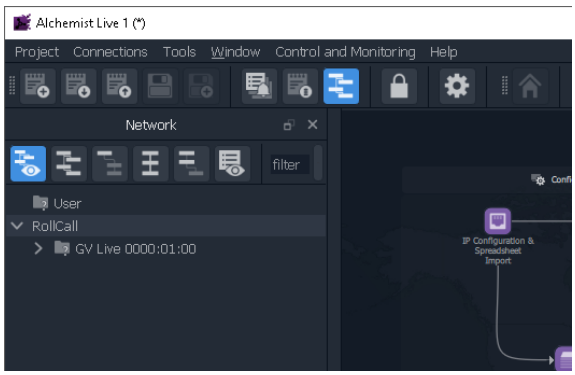


9. In the left hand pane of the Orbit Client a RollCall link will appear:

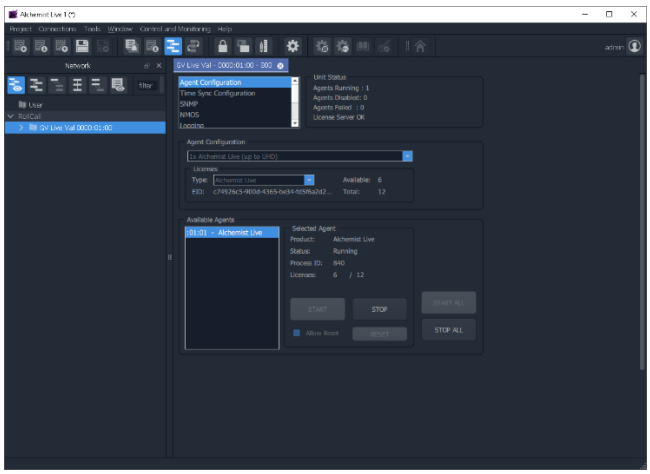


10. Click on the arrow adjacent to RollCall to expand the RollCall Tree

    The GV Live host Machine will appear:

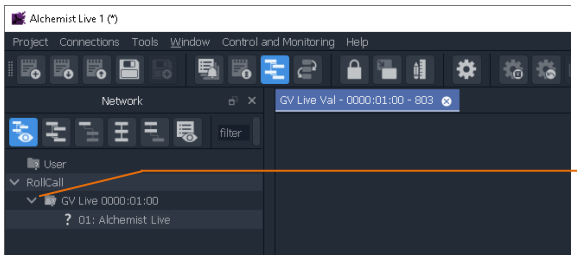


    Double click on the GV Host. The GV Live Host template will now open:

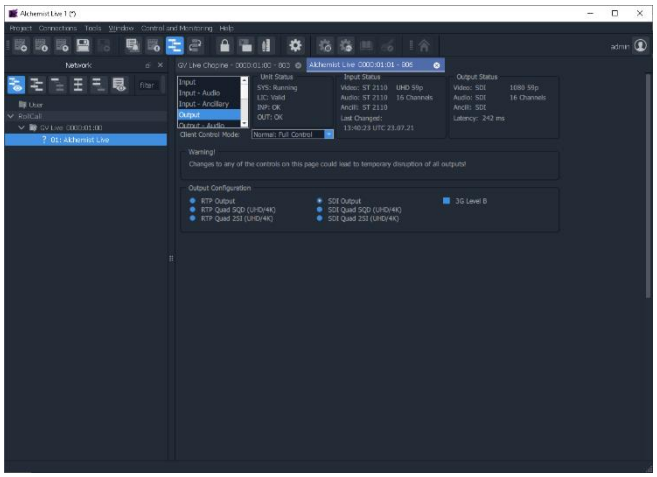


11. Click on the arrow adjacent to the GV Live to expand the tree.

    This will expose the Alchemist Live

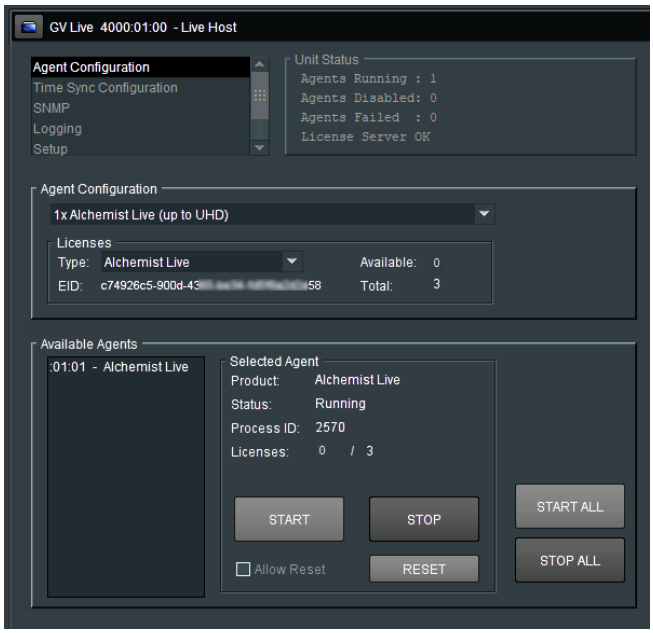


    Double click on the Alchemist Live to open the template.

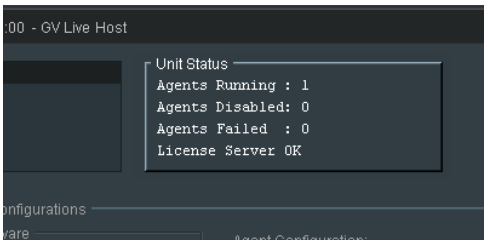


8. GV Live Template

8.1 Agent Configuration



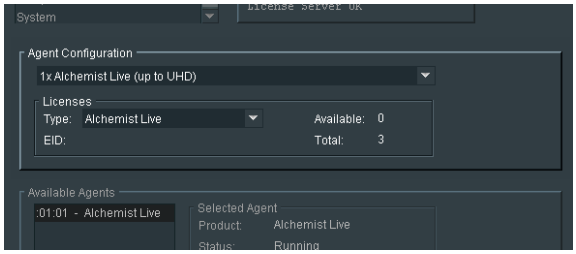
Note: that the Alchemist Live Agent should start automatically, and the **Unit Status** pane will show an Agent running:



If the Agent isn't running, it can be started by selecting the relevant Agent in the **Available Agents** pane, and pressing the **START** button.

If multiple Agents have been configured, all Agents can be started by pressing the **START ALL** button.

8.1.1 Agent Configuration

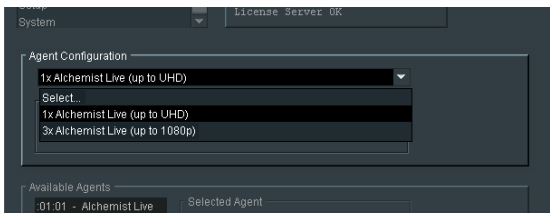


Agent Configuration

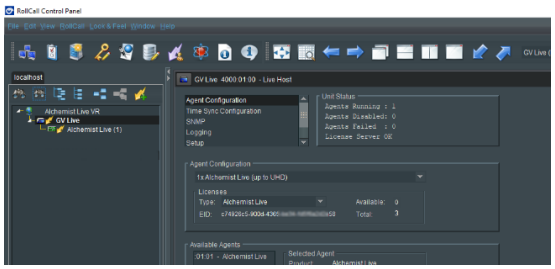
In the **Agent Configuration** pane, the Alchemist Live maybe configured to be:

- A single channel Alchemist Live supporting up to 4K resolution conversion.
- A three channel Alchemist Live supporting up to 3G (no 4K).

Configuration is via a drop-down menu:

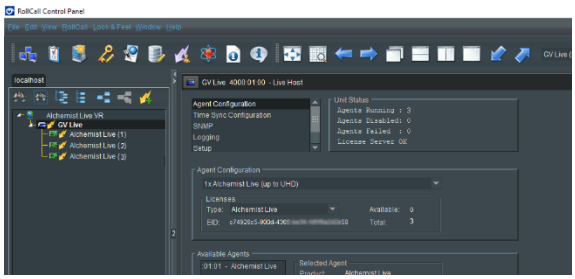


When configured as a single Alchemist Live supporting 4K conversion:



Note that only a single Alchemist Live is available in the connection pane.

When configured as 3x Alchemist Live supporting up to 3G conversion:



3x Alchemist Live Agents are now available in the connection pane.

Note: to reconfigure the Alchemist Live as a single 4K Agent, or as a 3x 1080p (3G) Agents, the Alchemist Live Agent(s) must first be stopped (see part 8.1.1 below).

Licenses

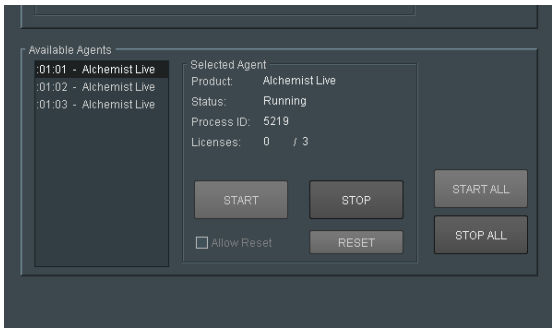
Licensing details are displayed within the **Available Agents** pane.

An Alchemist Live installation will have a total of 3 licenses.

- 3 licenses are required for a single conversion process that includes a 4K resolution (either input or output).
- 3 licenses allow up to 3 independent conversion processes, each up to 1080p resolution (conversions from, or to 4K, will be prohibited).

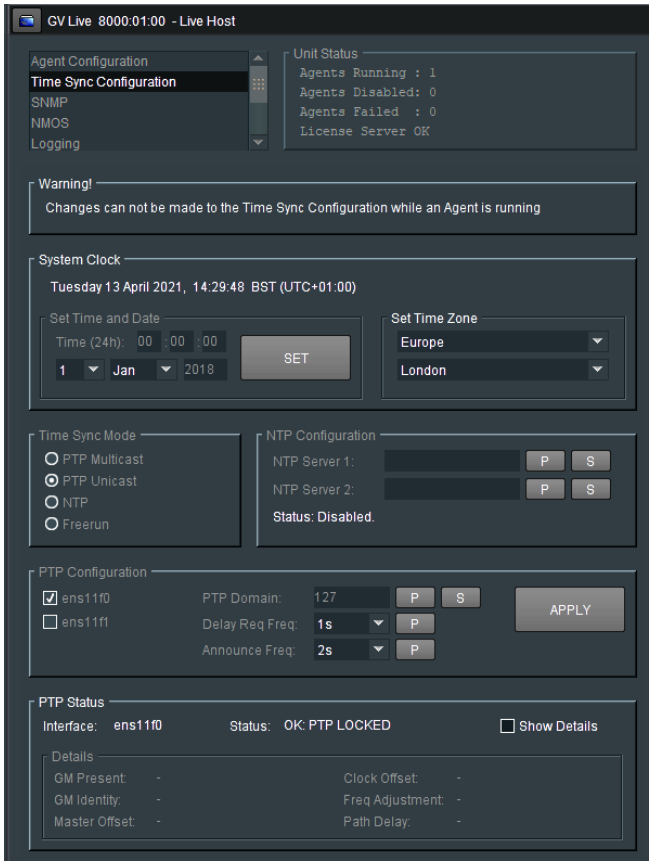
8.1.2 Available Agents

In the **Available Agents** pane, confirmation that the Alchemist Live Agent is running will be displayed:



Note: Alchemist Live Agents can be manually *stopped* and *started* from within the **Configured Agents** pane.

8.2 Time Sync Configuration

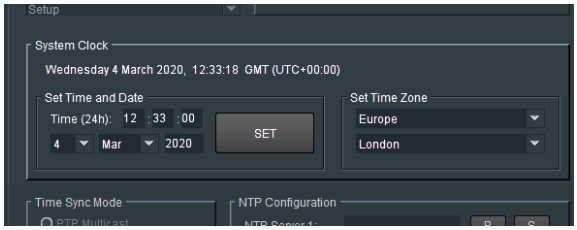


Although Alchemist Live offers several locking modes, it is highly recommended to lock Alchemist Live to a PTP Server, to ensure optimal performance.

Note: to make changes to the **Time Sync Configuration** menu, the Agent must be in a stopped state.

8.2.1 System Clock

In the **System Clock** pane, the **Set Time and Date** menu will only be active if the **Time Sync Mode** is set to **Freerun.**



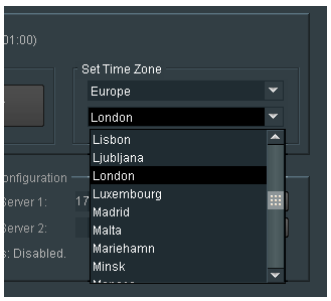
The time and date can be manually entered. Time to the nearest second can be configured and synchronised to an external clock by pressing **SET** at a precise moment.

Note: after each set of digits is entered, press 'Return' on the keyboard to make the setting permanent.

When **NTP** mode is selected, the time stamp will referenced to an external NTP server and so there is no requirement to set the system time.

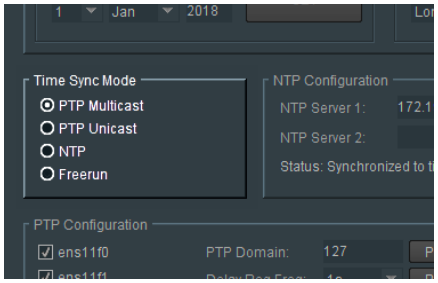
When **PTP** mode is selected, the time stamp will referenced to an external PTP server and so there is no requirement to set the system time.

Set Time Zone



The relevant Time Zone can be set using the drop-down menu.

8.2.2 Time Sync Mode

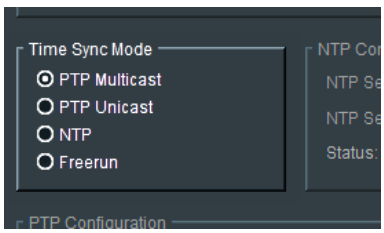


Four Time Sync modes are offered:

The Time Sync Mode can be set to be either:

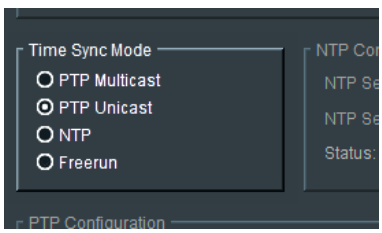
- **PTP Multicast**
- **PTP Unicast**
- **NTP**
- **Freerun**

PTP Multicast Mode



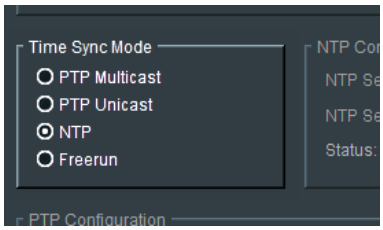
This setting will allow the Alchemist Live to be locked to a Multicast PTP Server. The details of the specific PTP server should be configured in the PTP Configuration field (see section 8.2.4 below).

PTP Unicast Mode



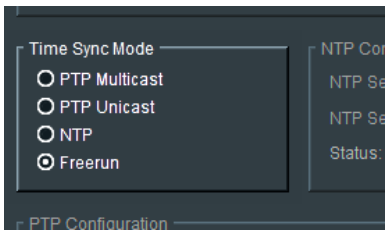
This setting will allow the Alchemist Live to be locked to a Unicast PTP Server. The details of the specific PTP server should be configured in the PTP Configuration field (see section 8.2.4 below).

NTP Mode



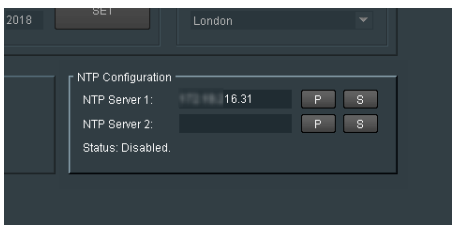
This setting will allow the Alchemist Live to be locked to a NTP Server. The details of the specific NTP server should be configured in the **NTP Configuration** field (see section 8.2.3 below).

Freerun Mode



This setting will allow the Alchemist Live to be locked to the System Clock (described in section 8.2.1 above).

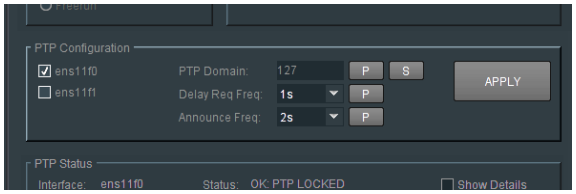
8.2.3 NTP Configuration



Here the NTP timestamp source can be defined. The IP Address of the NTP server can be entered and set by pressing ‘S’.

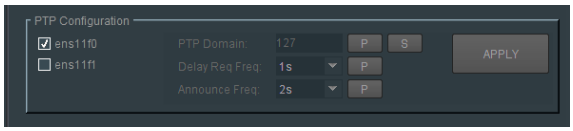
An alternative NTP Server can also be defined. Should something happen the first NTP Server making it unavailable, the alternative NTP server will act as backup.

8.2.4 PTP Configuration



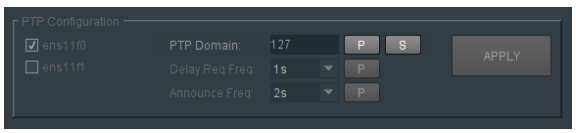
Here the details of the PTP Server are configured.

ens11f0 and **ens11f1**



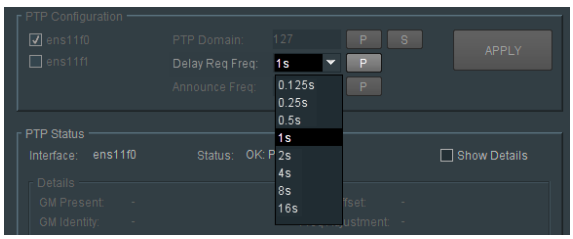
The Interfaces **ens11f0** and **ens11f1** are used to communicate with PTP Clock Services on the specified domain.

PTP Domain



This control allow the User to configure the required network domain that the PTP Clock services are running on.

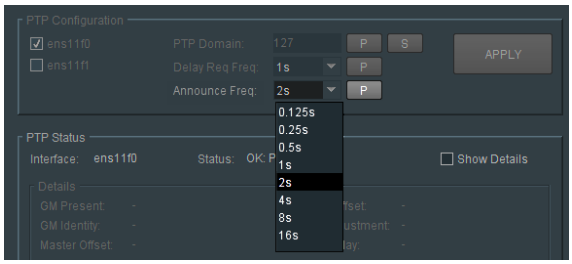
Delay Req Freq



The Delay Request Frequency control is a component of the communication between the PTP Slave and Master. Adjustment maybe necessary to compensate for Network tolerance.

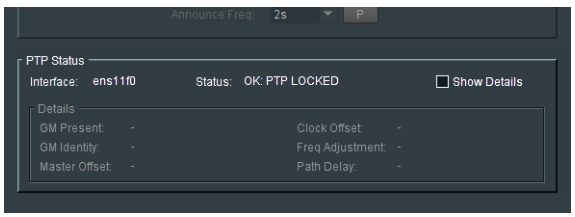
Any changes will only be actioned when pressing: **Apply**.

Announce Freq



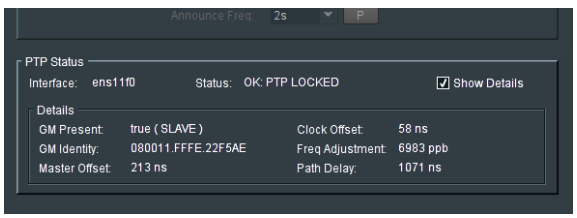
The **Announce Freq**, as the name suggest, defines the frequency that the PTP Server announces itself to the Alchemist Live.

8.2.5 PTP Status



The **PTP Status** pane reports the state of the PTP synchronisation.

The **Show Details** control, when enabled, will cause the **Details** pane to become active:



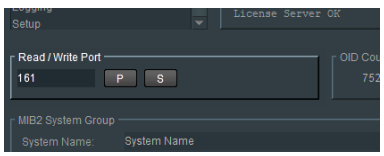
8.3 SNMP

Alchemist Live supports SNMP version v2c.

The SNMP feature allows the Alchemist Live system to be controlled via a universal SNMP Control Application.

Alchemist Live can also report its status to the SNMP Application, via SNMP traps.

8.3.1 Read/Write Port

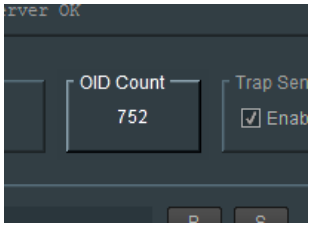


The default port for SNMP is: 161

If required, the port number may be manually set by manually typing it in and selecting the **S** button.

Pressing the **P** button will return the port number to the default value.

8.3.2 OID Count

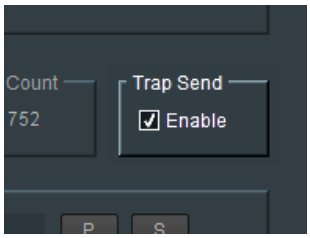


OID: Object Identifier.

The OID Count field reports the total number of active OID's configured.

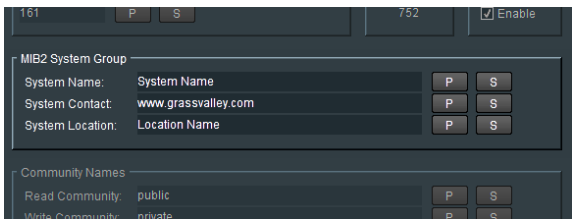
Note that the count will vary depending upon the Alchemist Live configuration.

8.3.3 Trap Send



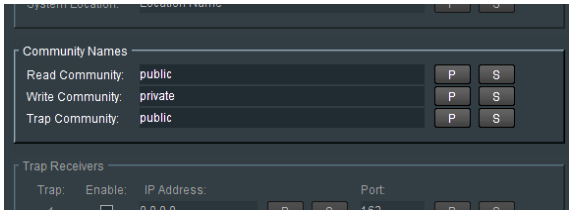
The sending of SNMP Traps can be enabled or disabled using the **Send Trap** control.

8.3.4 MIB2 System Group



User information used to easily identify a controlled device, in this case Alchemist Live, from the SNMP control application.

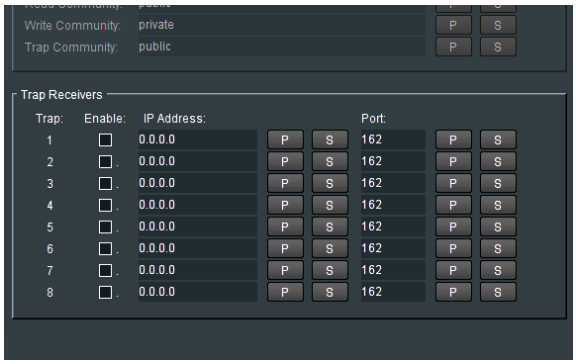
8.3.5 Community Names



SNMP mandates that the SNMP agents should accept request messages only if the community string in the message matches its community name. Therefore, the management application should always communicate with the agents along with the associated community name.

The default SNMP community names are "public" for read-only (GET) operations and "private" for read-write (SET) operations. The management applications should have provision to include the community names in its request messages.

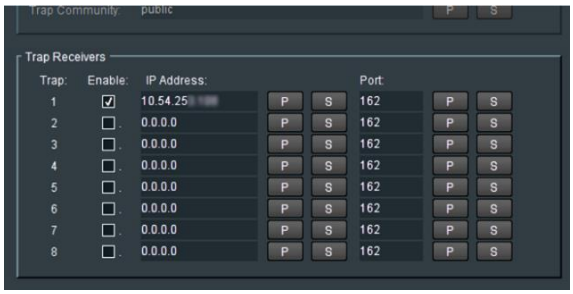
8.3.6 Trap Receivers



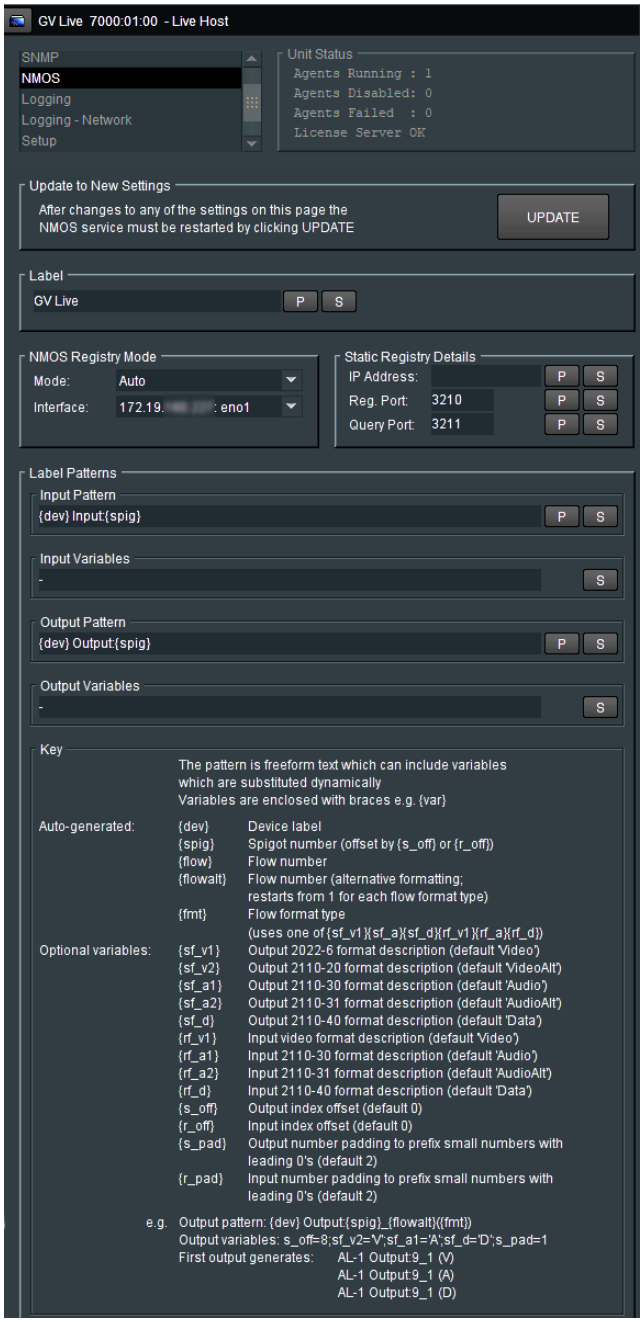
A Trap Receiver may be defined by its IP Address. Up to 8 receivers can be defined.

Specific Ports can be defined for each SNMP receiver.

In this example a single receiver has been configured:



8.4 NMOS



With the release of Version 3 software, Alchemist Live now supports NMOS.

Currently Alchemist Live supports IS04 and IS05 parts of the standard.

- IS04 - Discovery and Registration
- IS05 - Connection Management

The NMOS feature allows for discovery of devices/systems with their capabilities, register these devices/systems (IS-04) and from that the connectivity of devices/systems (IS-05).

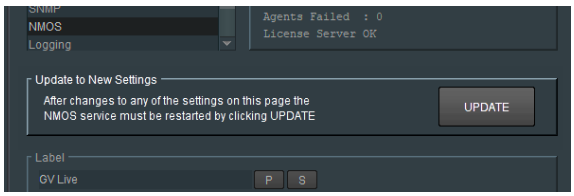
The **Pattern Labelling** of the Alchemist Live Host Agent may be configured to enable easy identification, within the NMOS Register. This may be particular important if multiple Alchemist Live systems are discovered by the NMOS Register.

The Pattern Labelling of the Alchemist Live Host Agent will be migrated to the Alchemist Live channel Agents. This means that in circumstances where the Alchemist Live is configured to be a 3x channel processor, it is not required to configure all three Agents, with respect to NMOS, separately.

At the NMOS HOST level, the following can be performed:

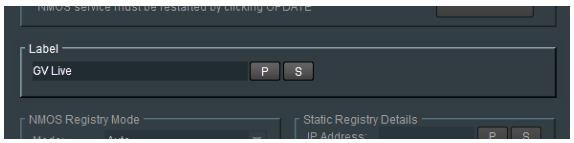
- Change the default 'GV Live' LABEL so the system can be more easily identified operationally, particularly if there are multiple Alchemist Live systems. If there is only one system then the default can be used.
- Set how to communicate with the NMOS Registry – Automatic or Static. If Automatic is selected then Alchemist Live will try and communicate with a Registry using a selected network interface, or it is possible to manually set specifics to the registry of choice to which it will communicate via the specified network interface.
- Set LABEL PATTERNS for the AGENTS - this acts as a base setting and are migrated to all AGENTS.

8.4.1 Update to new settings



If any changes are made to NMOS settings, the NMOS Service will require restarting, using the **UPDATE** button.

8.4.2 Label



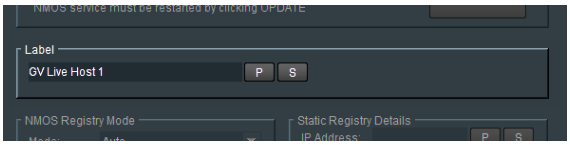
The label defines how the Alchemist Live IP will appear in the NMOS register.

The default label is:

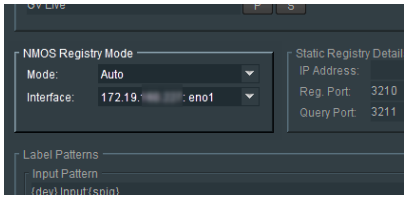
- **GV Live**

Should there be multiple Alchemist Live systems available, it is probably desirable to give each system a unique label.

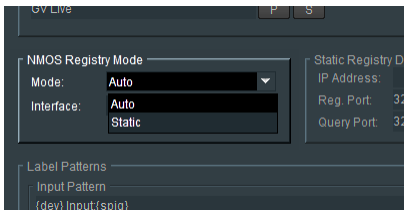
In the example below, the **Label** has be changed:



8.4.3 NMOS Registry Mode



Mode



The Mode may be set to either:

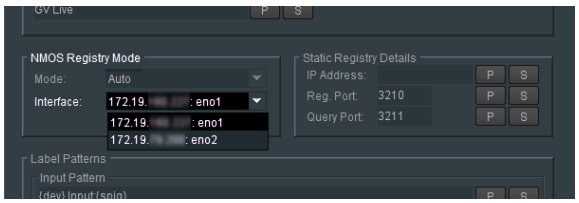
- **Auto:**

  In the Auto mode, Alchemist Live will communicate and connect with any NMOS Register on the local network.

- **Static:**

  In Static mode, Alchemist Live will communicate and connect to the defined NMOS Register. This mode should be used when multiple NMOS Registers are available on the associated network and it is not desired for the Alchemist Live to appear in all of them.

Interface



The **Interface** menu allows the User to configure the NMOS Interface adaptor.

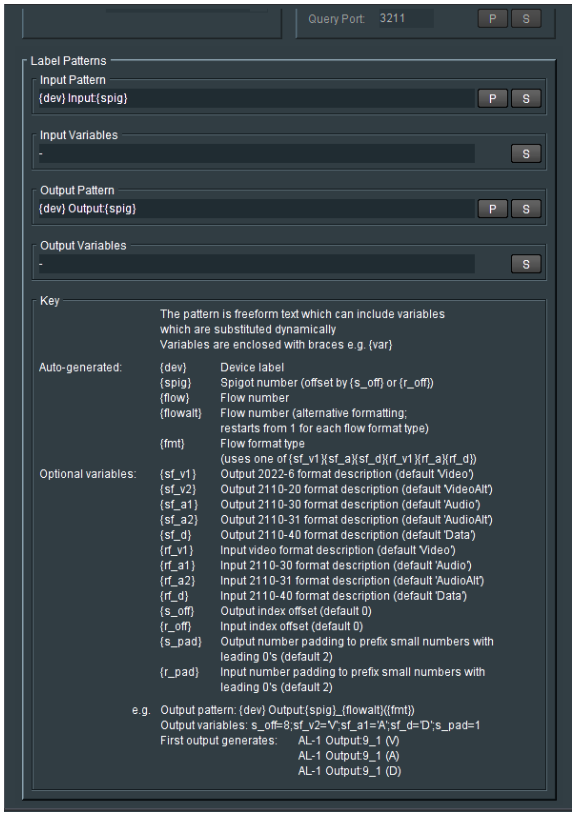
8.4.4 Static Registry Details

If the **Mode** is set to **Static,** the **Static Registry Details** field should be used to define the NMOS Registry.

The **Static** mode can be employed in circumstances where there are more than one NMOS Registry on the defined network and it may be desired that the Alchemist Live appears only on a particular NMOS Registry.

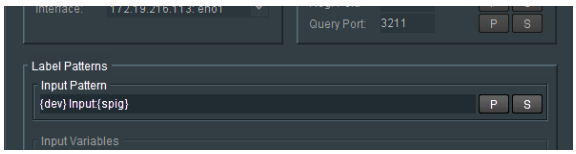
The desired NMOS Registry can be configured in the **Static Registry Details** field.

8.4.5 Label Patterns



The configuration of the NMOS menu at the GV Live Host level will act as base settings for each Alchemist Live Agent. Settings within the Host Agent will migrate down to the channel Agents.

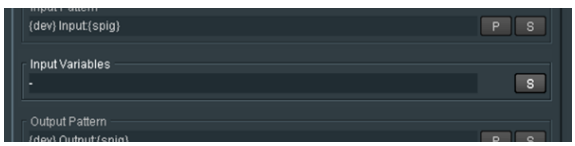
Input Pattern



This allows the User to define how the Input Connector will appear in the NMOS Registry.

The parameters should be entered in terms defined by the **Key** (see below).

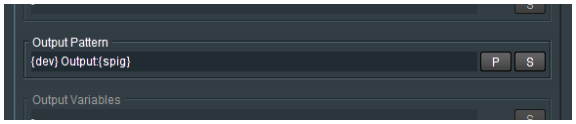
Input Variables



Allows optional variables to be configured, so adding more detail to the Alchemist Live within the NMOS Registry.

The parameters should be entered in terms defined by the **Optional Variables** in the **Key**.

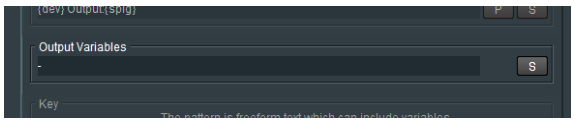
Output Pattern



This allows the User to define how the Output will appear in the NMOS Registry.

The parameters should be entered in terms defined by the **Key**.

Output Variable



Allows optional variables to be configured, so adding more detail to the Alchemist Live within the NMOS Registry.

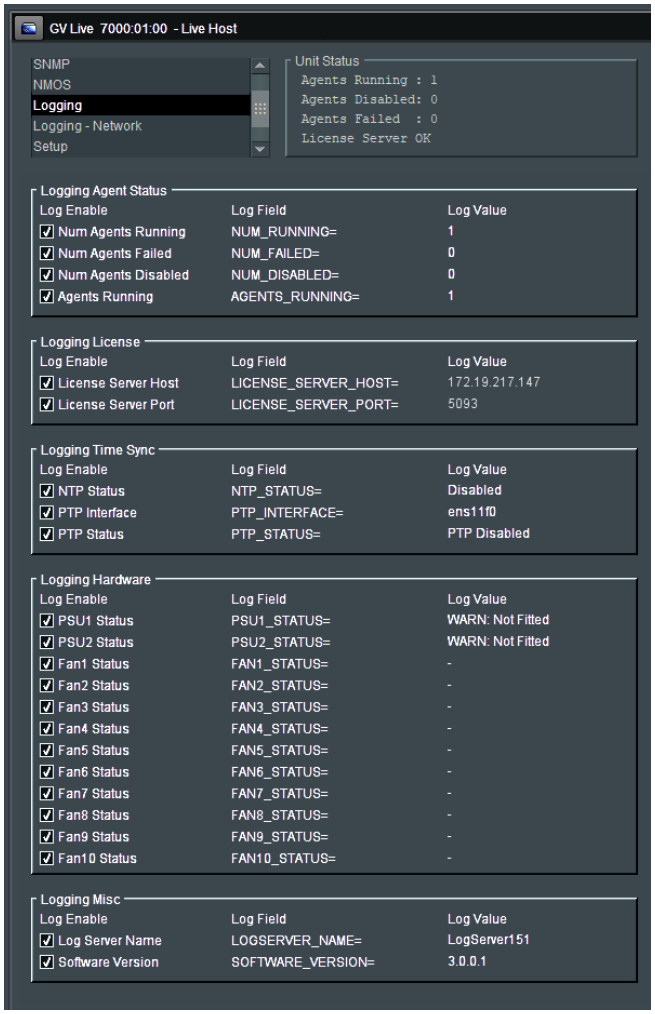
The parameters should be entered in terms defined by the **Optional Variables** in the **Key**.

Key

The **Key** lists the terms that can be used to define the Alchemist Live, in the NMOS Register.

Note: A Label Pattern example is shown in Appendix F below.

8.5 Logging

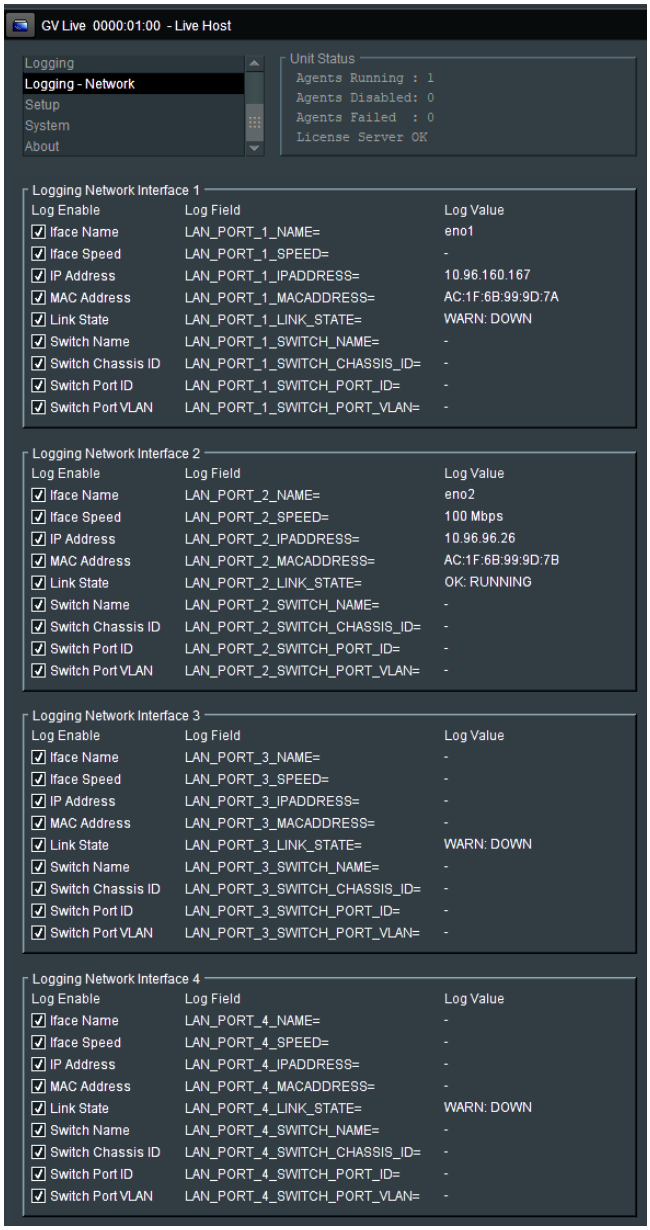


Logging is reported to RollCall log server and also is used for SNMP traps

In the **Logging** window, Log fields maybe be disabled and enabled. Log fields are sent to the defined Log Server (see 8.7.5 below).

The **default** configuration is everything **enabled**.

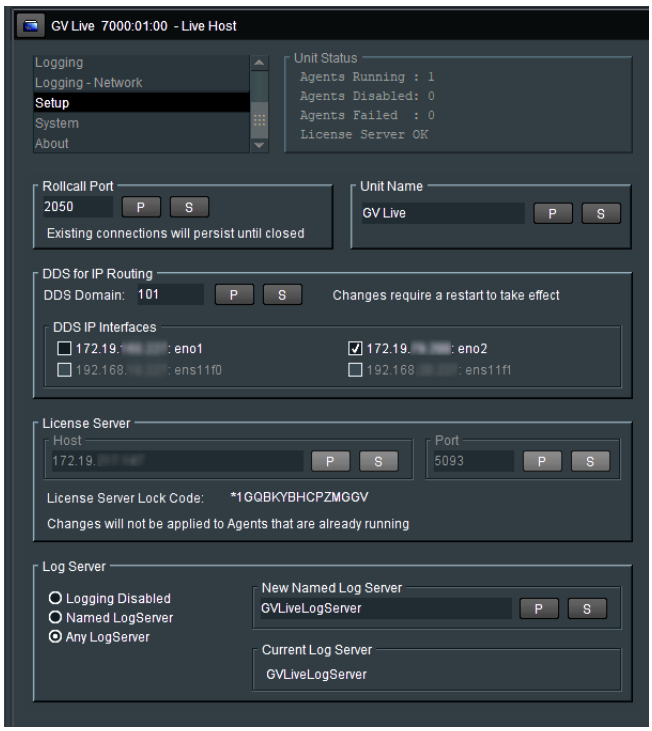
8.6 Logging - Network



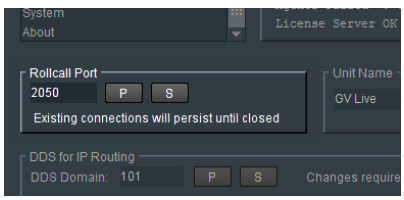
In the **Logging - Network** window, Log fields maybe be disabled and enabled. Log fields are sent to the defined Log Server (see 8.7.5 below).

The **default** configuration is everything **enabled**.

8.7 Setup



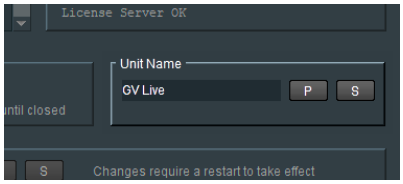
8.7.1 RollCall Port



The default **RollCall Port** is 2050.

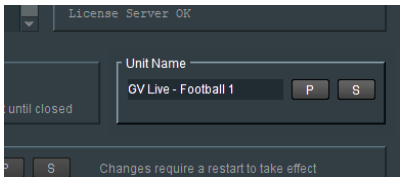
In normal circumstances the **RollCall Port** is left in its default setting. However, an alternative RollCall port can be configure here, if required.

8.7.2 Unit Name



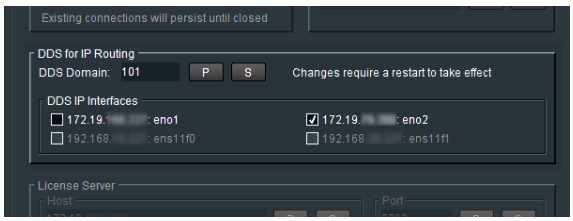
This is the identifying name of the GV Live product/unit/application. If several GV Live products are running, it may be desirable to give them individual names.

To edit the unit name, simply type the desired name in the box and press ‘S’ to *save.*



Pressing the ‘P’ button will return the name to its default setting: **GV Live**

8.7.3 DDS for IP Routing



Here the relevant DDS Domain can be defined.

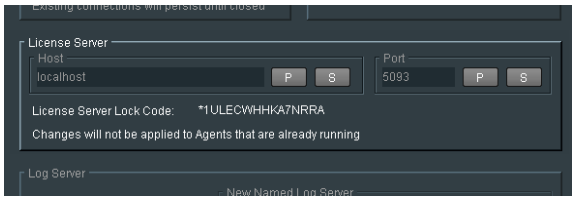
In this example the DDS Domain has been defined to be 101.

DDS IP Interfaces

Here the relevant Interface can be selected for DDS traffic.

DDS traffic cannot be transmitted via the media interfaces ens11f0 and ens11f1, hence these are greyed out and cannot be selected.

8.7.4 License Server



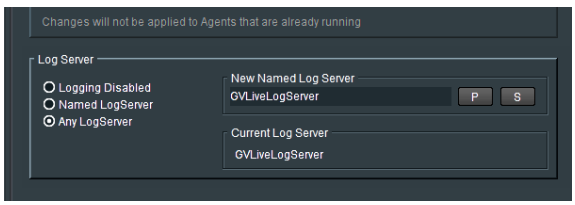
This field details the relevant License Server of the Alchemist Live. In normal circumstances the License Server runs on the Product/Turnkey host machine, hence the **Host** is defined as **Localhost.**

The default **Port** is 5093.

These items are fixed and cannot be changed.

License Server Lock Code: The Alchemist Live license is locked to the hardware that the License Server is running on. In normal circumstances the License Server runs on the Product/Turnkey host machine, hence the Lock Code relates to Alchemist Live host machine.

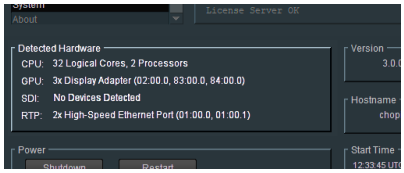
8.7.5 Log Server



Here the desired **Log Server** can be defined.

8.8 System

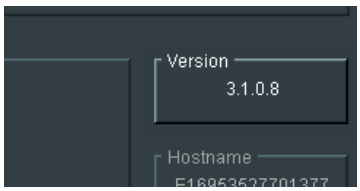
8.8.1 Detected Hardware



Displays the detected hardware of the host machine.

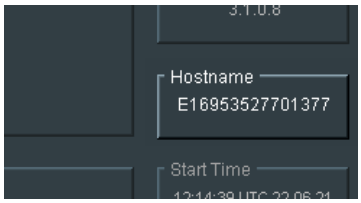
Note: Alchemist Live IP does not employ SDI Interfaces, hence **No Devices Detected** will be displayed.

8.8.2 Version



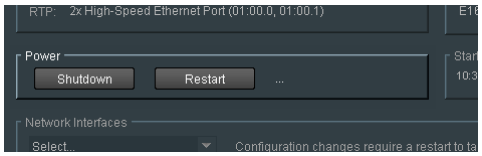
Reports the software version of the Alchemist Live.

8.8.3 Hostname



The host name of an Alchemist Live displays the Serial Number of the Server Enclosure.

8.8.4 Power

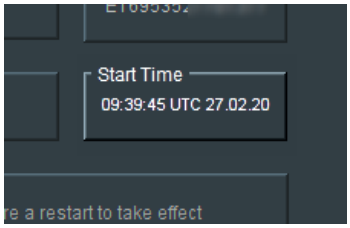


The **Shutdown** and **Restart** controls can be used to remotely either power-down, or power-cycle, the Alchemist Live Host Machine.

Note: that if the Host machine is powered-down, the RollCall Template will close and it will not be possible to restart the system via RollCall.

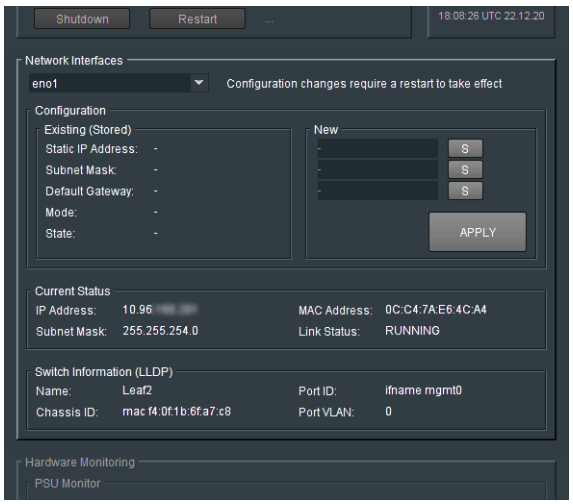
Remote power-up is possible via the IPMI port (see **Section 11**, below).

8.8.5 Start Time



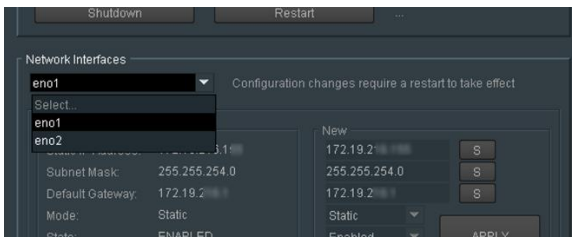
Reports the start time that the Alchemist Live system was last started up.

8.8.6 Network Interfaces



The Alchemist Live Host Machine has two ports: **eno1** and **eno2.** These are used for general network coms.

The other two ports: **ens1f0** and **ens1f1**, are used to interface the video and audio streams, to and from, the Alchemist Live Host Machine. Each NIC can be selected from the drop-down menu:

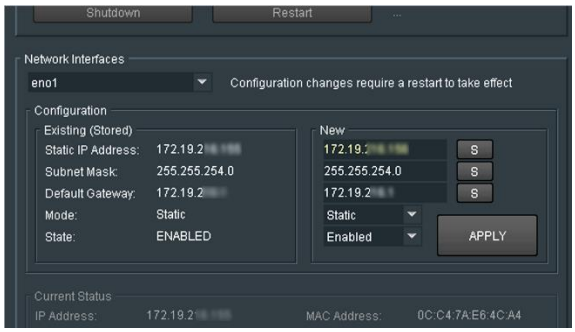


By definition, NIC **eno1** must be configured with a Static IP. It cannot be configured to be DHCP.

All other NICs may be configured to be either Static, or DHCP.

Once the NIC has been selected, the current connection details, if configured, will be displayed in the **Existing (Stored)** field.

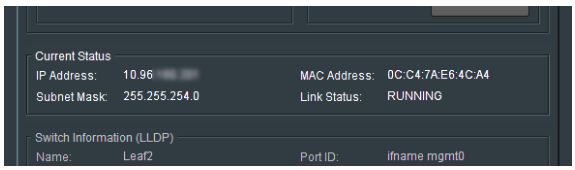
If a new connection is to be configured, the details should be entered in the **New** field:



Select **Apply** to make the changes permanent.

The changes to the Network configuration will only be adopted once the Agent is restarted.

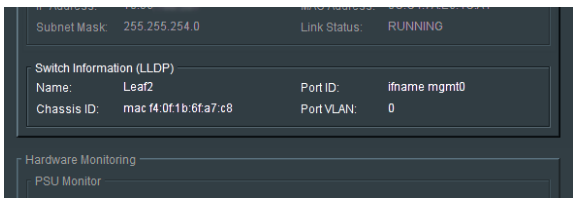
Current Status



This field will display the status of the current NIC (as selected above).

Conformation of the current **IP Address**, the **MAC Address** and **Link Status** are displayed in the **Current Status** field.

Switch Information (LLDP)



LLDP enables the reporting of upstream network connections if the neighbours are LLDP enabled.

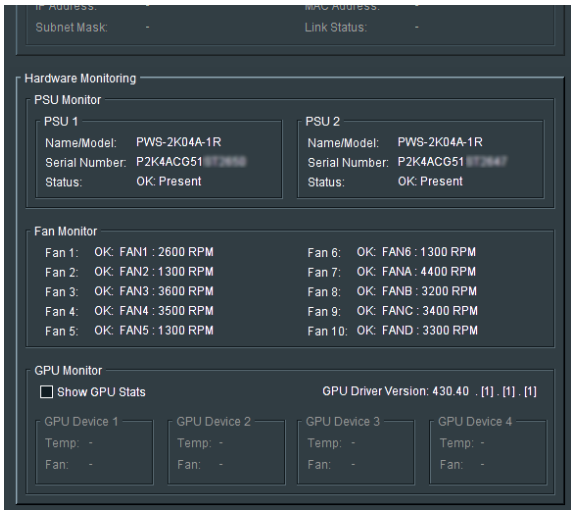
The details of the network connection are reported back to the Alchemist Live.

This could include the switch Port ID of the Network Switch Alchemist Live is connected to, and if capable, the associated VLAN Port.

Note: **LLDP** is an acronym of: **Link Layer Discovery Protocol**

(see **Table 1: Table of Terminology** section 1 above).

8.8.7 Hardware Monitoring

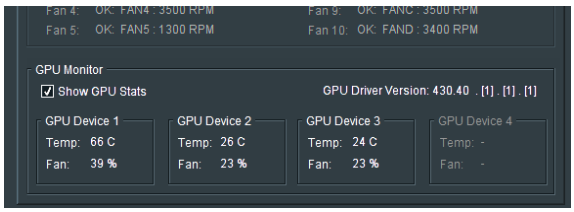


The Alchemist Live **Hardware Monitoring** feature constantly monitors the Host hardware.

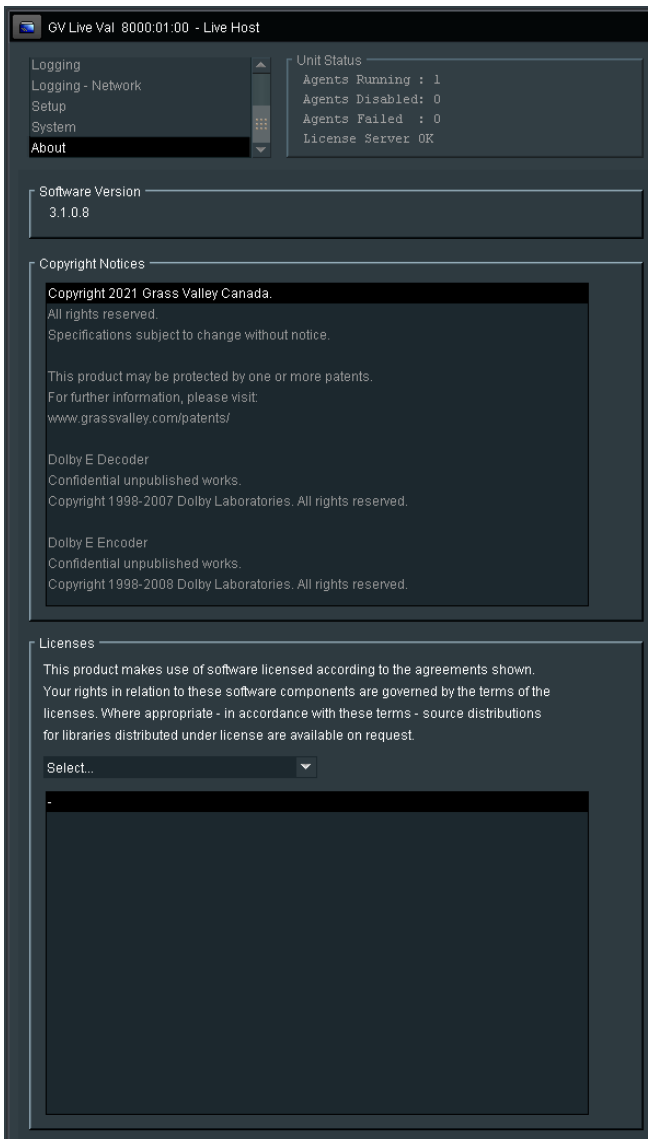
Hardware Monitoring reports the state of:

- PSU (x2)
- Fans (x10)
- GPU (x3)

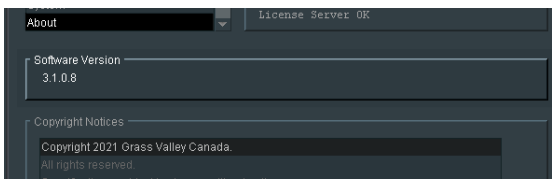
When **Show GPU Stats** is checked, the temperature and fan status will be displayed for each installed GPU:



8.9 About

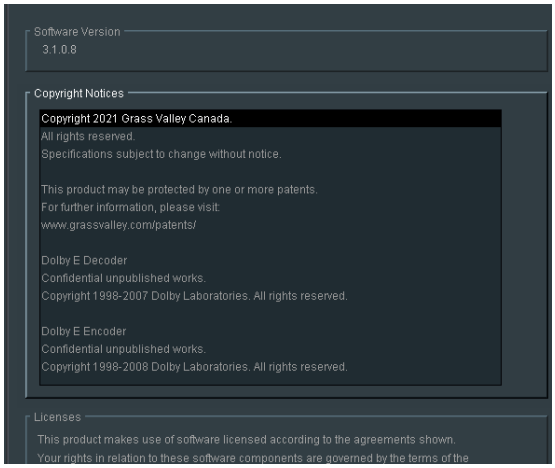


8.9.1 Software Version



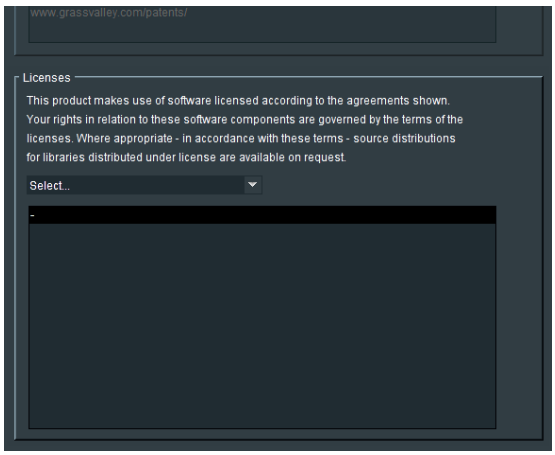
Reports the installed version of Alchemist Live software.

8.9.2 Copyright Notice



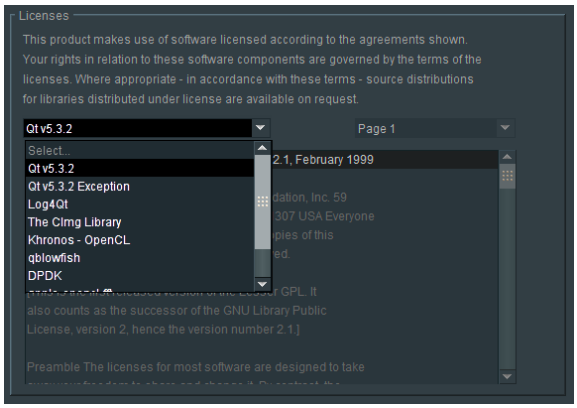
Reports Copyright information.

8.9.3 Licenses

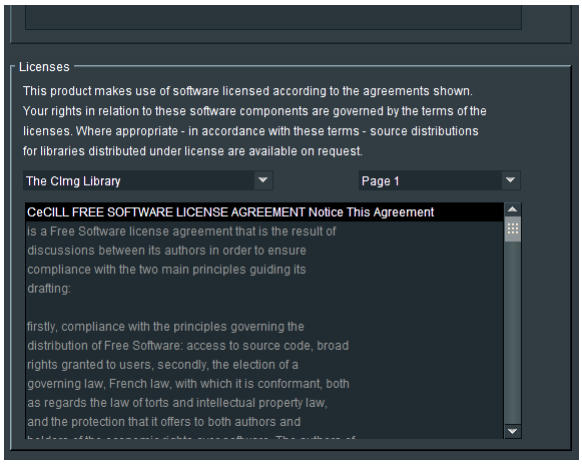


Reports information pertaining to third party licensing associated with Alchemist Live.

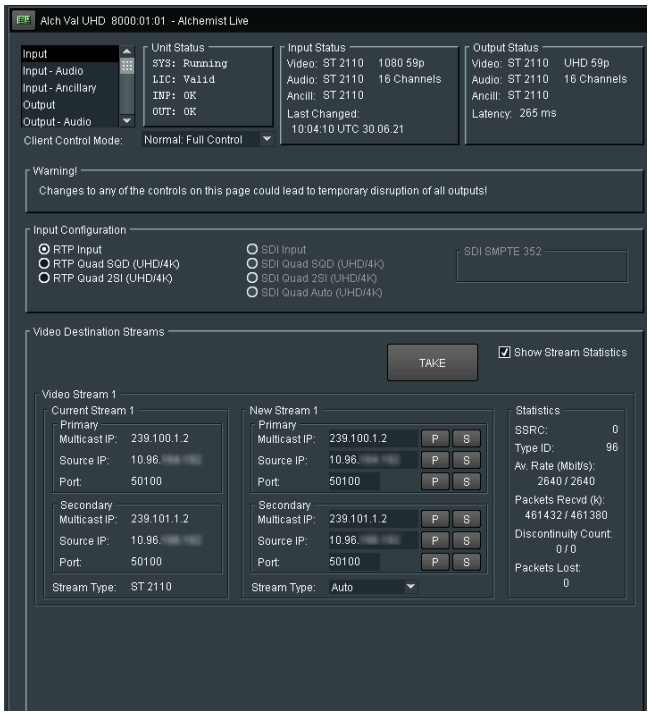
Specific licensing can be selected from a drop-down menu:



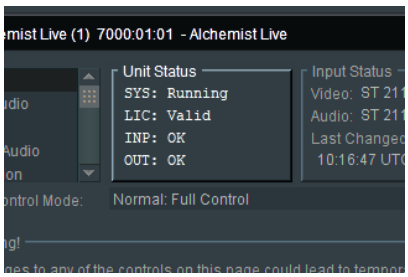
Once selected, specific license information will appear below.



9. Alchemist Live



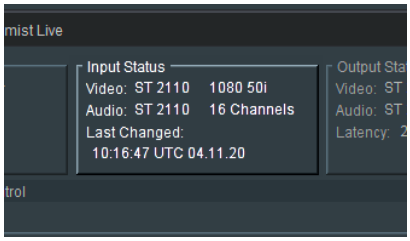
9.1 Unit Status



Here confirmation is given that the:

- **System** (SYS) is running.
- **License** (LIC) is valid and present.
- **Input** (INP) is valid.
- **Output** (OUT) is valid.

9.2 Input Status

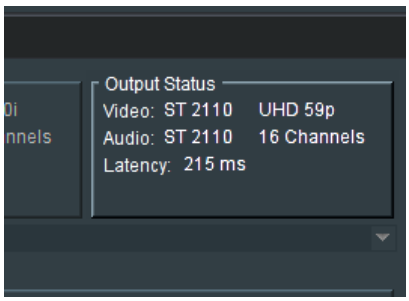


Here **Video** and **Audio** sources are confirmed.

The Input Video standard is confirmed. In this example it is:

- 1080/50i video compliant to: SMPTE ST 2110 (-20)
- 16 channels of audio, compliant to: SMPTE ST 2110 (-30)

9.3 Output Status

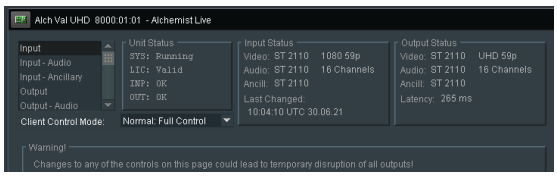


Here the configured output video format and standard are confirmed.

The number of output audio channels is confirmed.

The system latency is reported in terms of *ms*.

9.4 Client Control Mode



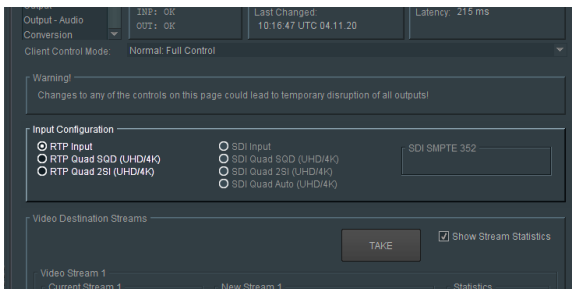
The Client Control Mode has two possible settings, selectable from a drop-down menu:

Normal: Full Control: Full control via RCP, enabled.

Safe: Monitor Only: Control via RCP inhibited, but template can be viewed.

9.5 Input

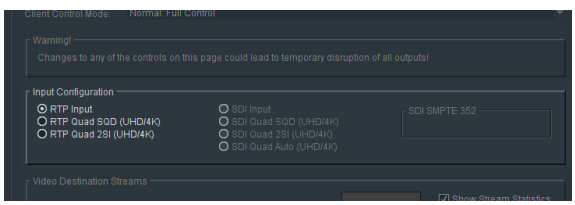
9.5.1 Input Configuration: RTP Input / RTP Quad Link



The input format is selected in the **Input Configuration** field.

RTP Input:

RTP Input supports formats SD, HD, 3G and now in V3, single stream 4K.

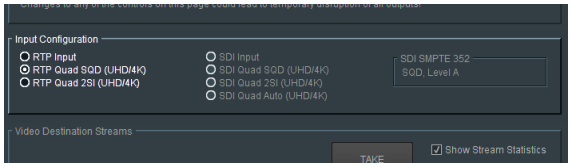


The detected input is reported in the **Input Status** pane.

RTP Quad Link - UHD/4K (SQD or 2SI)

UHD or 4K Inputs can either be Single Stream, or Quad Link.

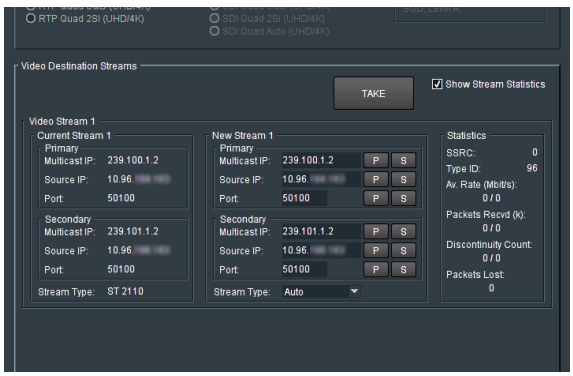
When Quad Link inputs are applied, the relevant control should be set in the **Input Configuration** window.



When the applied input is UHD or 4K Quad Link, the appropriate setting is either:

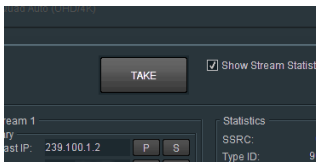
- **RTP Quad Square (UHD/4K)**
- **RTP Quad 2SI (UHD/4K)**

9.5.2 Video Destination Streams



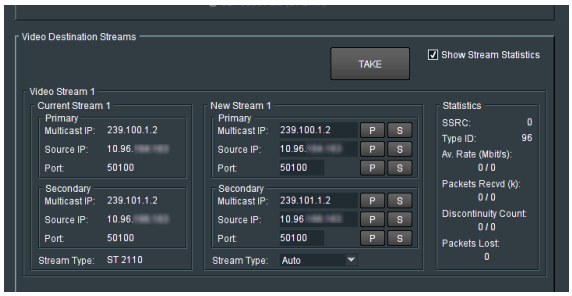
Note: The incoming RTP Streams to Alchemist Live are referred to as Destination Streams. The IP details entered will be the output side of the source device i.e. the upstream source device's destinations.

Take



Changes made to the **Video Destination Streams** menu will only be implemented by pressing the **Take** button.

Video Streams



The appropriate **RTP Source** details are configured in the **Video Stream 1** menu.

Single Stream Input

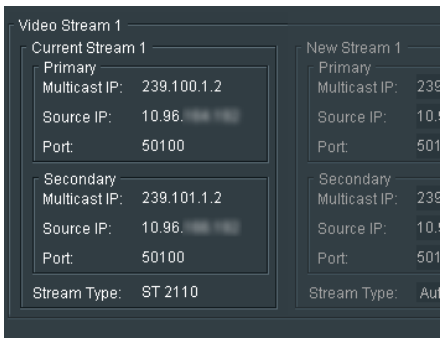
When the input is SD, HD, 3G, or 4K single stream, the transmission is via a single video stream, hence only **Video Stream 1** will appear and require configuration.

The input video should be compliant to: **SMPTE ST2110-20**, **SMPTE ST2022-6** or **SMPTE ST2110-40**

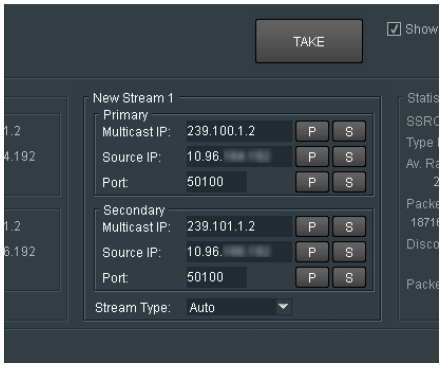
Note: SD SMPTE ST2022 formats are not supported by Alchemist Live IP.

Current Stream 1

The **Current Stream 1** field will report the current connection.

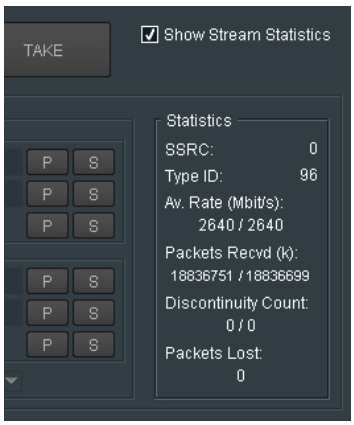


New Stream 1



Should the input require reconfiguration to a different source, the details of the new source should be entered in the relevant **New Stream 1** field and the **Take** button pressed to action the change.

Statistics



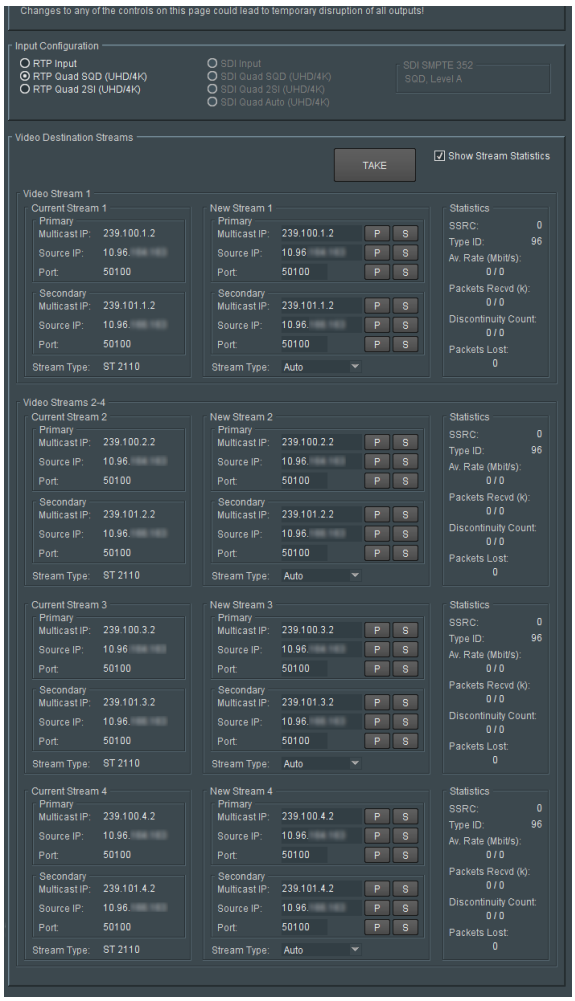
When enabled the Statistics field will detail statistics of the associated video stream.

Stream statistics can be shown, or hidden, by setting the check-box **Show Stream Statistics**.

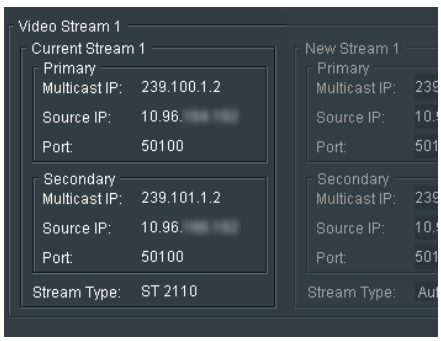
RTP Quad Output

Video Destination Streams

When the applied input is UHD/4K Quad Link, the **Video Destination Streams** menu will display four input streams that will require configuration:

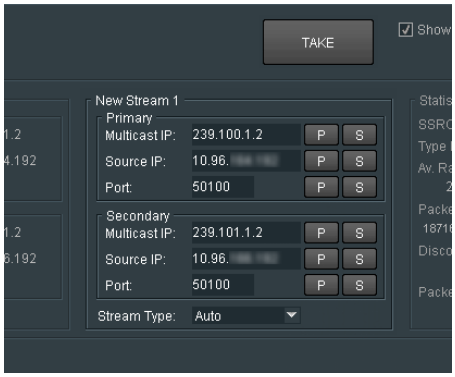


Current Stream (1, 2, 3, & 4)



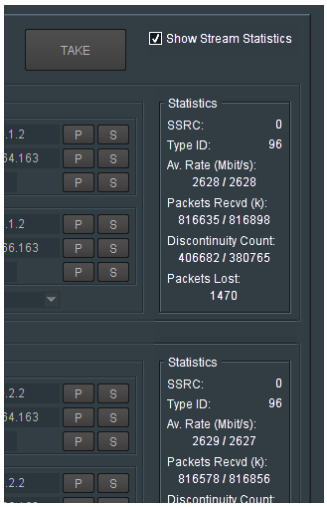
The **Current Stream** field will report the current connections of the incoming stream.

New Stream (1, 2, 3, & 4)



Should the input require reconfiguration to a different input, the details of the new input should be entered in each of the four **New Stream** fields and the **Take** button pressed to action the change.

Statistics



When enabled the Statistics field will detail statistics of the associated video stream.

Stream statistics can be shown, or hidden, by setting the check-box **Show Stream Statistics.**

9.6 Input - Audio

A video stream compliant to SMPTE, ST 2110-20 will be video only (no audio). Any associated audio will be carried in a separate stream, or could be multiple streams and this will require configuration.

Alchemist Live IP supports up to four input audio streams.

Alchemist Live IP is limited to processing 16 channels of audio in total. These 16 channels can be chosen from any of the input audio streams.

An audio stream can carry up to 64 channels of audio. Alchemist Live can only map audio from the top 16 channels of any input stream.

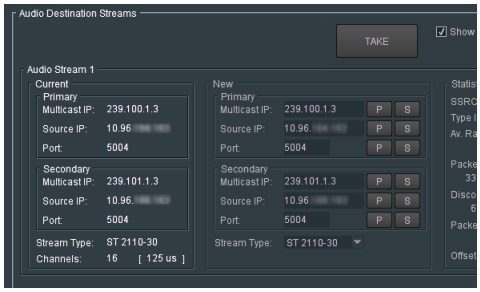
Audio mapping is explained below in section 9.13.3

9.6.1 Audio Destination Streams

Audio Stream (1, 2, 3 & 4)

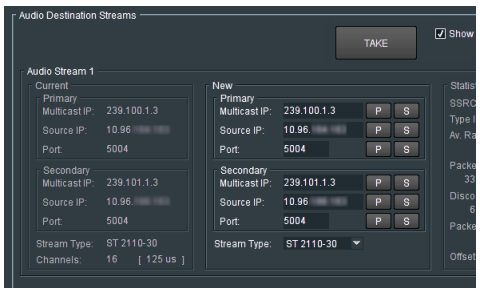
Current

The **Current Stream** field will report the current connection.

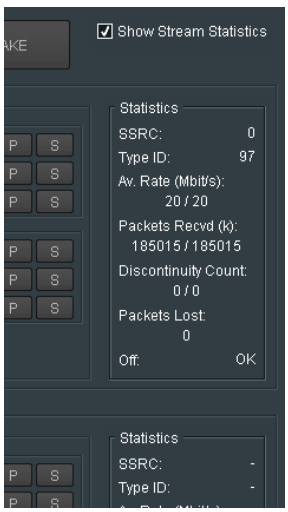


New

Should the input require reconfiguration to a different input, the details of the new input should be entered in the relevant **New** Stream field and the **Take** button pressed to action the change.

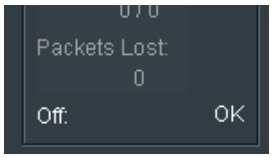


Stream Statistic



Stream statistics can be shown, or hidden, by setting the check-box **Show Stream Statistics.**

Off (Offset)



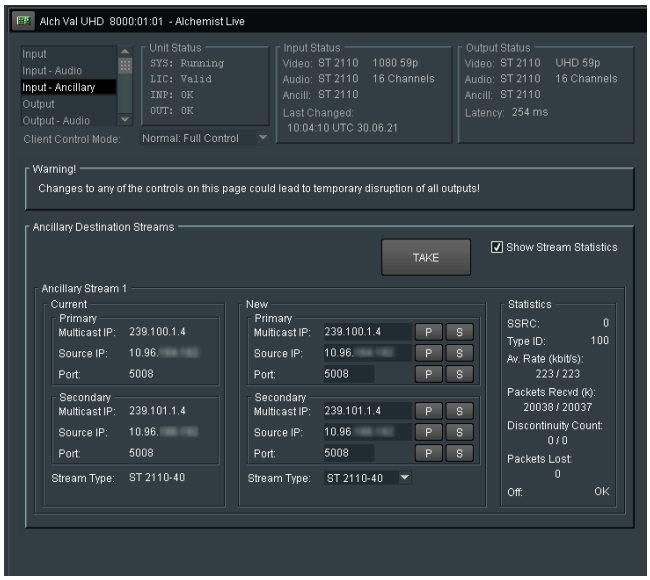
The **Off:** statistic indicates the offset of the Audio Stream, compared to the Video Stream. Measurement is made using Timestamp of the associated streams.

Any offset should be less than a frame and will indicate **OK.**

In circumstances where the offset exceeds a frame, an error will be reported.

Note that Alchemist Live cannot correct this error and the source of the offset should be investigated upstream.

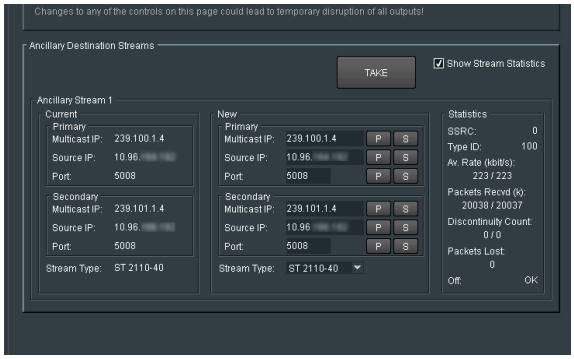
9.7 Input – Ancillary



Introduced in V3.1.0.8, Alchemist Live IP now supports SMPTE ST2110-40.

SMPTE ST2110-40 supports the passing of Ancillary data which is transported in a separated stream.

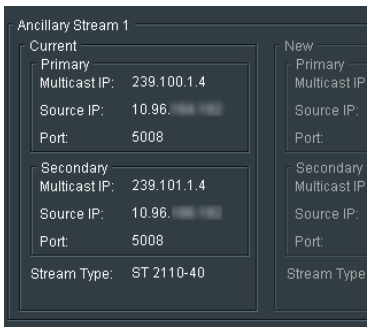
9.7.1 Ancillary Destination Stream



Ancillary Stream 1

Current

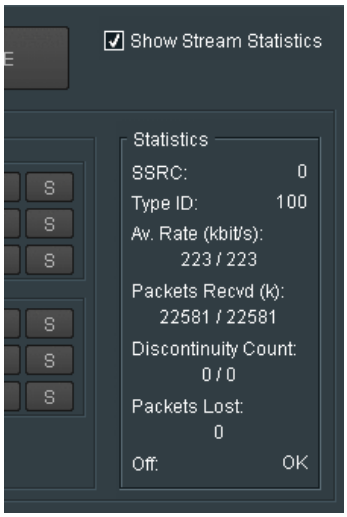
The **Current** field will report the current connection.



New

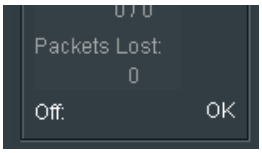
Should the input require reconfiguration to a different input, the details of the new input should be entered in the relevant **New** stream field and the **Take** button pressed to action the change.

Statistics



Stream statistics can be shown, or hidden, by setting the check-box Show Stream Statistics.

Off (Offset)



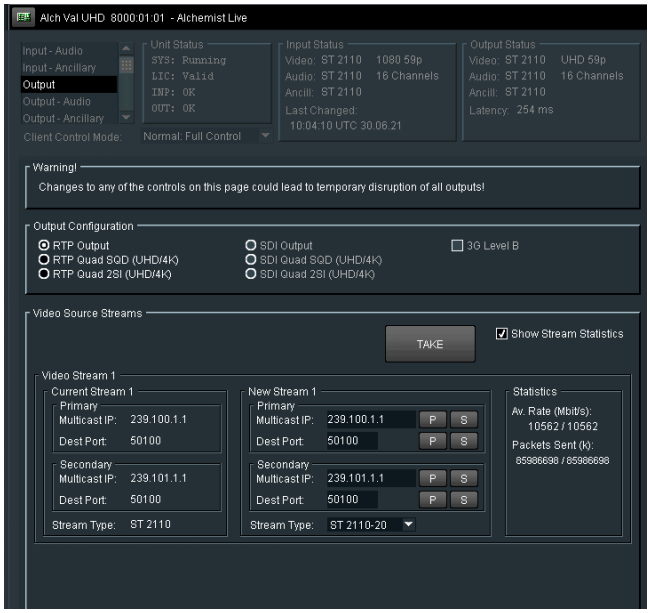
The **Off:** statistic indicates the offset of the Ancillary Stream, compared to the Video Stream. Measurement is made using Timestamp of the associated streams.

Any offset should be less than a frame and will indicate OK.

In circumstances where the offset exceeds a frame, an error will be reported.

Note that Alchemist Live cannot correct this error and the source of the offset should be investigated upstream.

9.8 Output

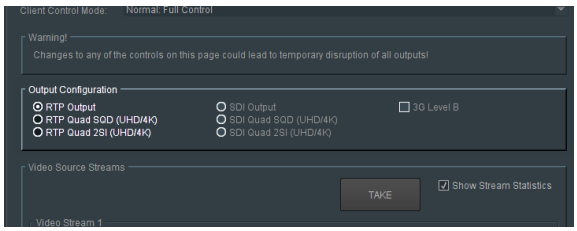


9.8.1 Output Configuration

The output format is selected in the **Output Configuration** field.

RTP Output

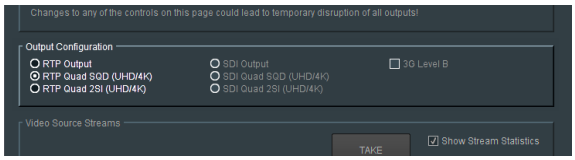
When the required output is SD, HD or 3G, or single stream 4K, **RTP Output** should be selected.



When the output is configured to be RTP the output will conform to:

- **Video - SMPTE ST 2022-6**, or **ST 2110-20**
- **Audio - SMPTE ST 2110-30** or **ST 2110-31**

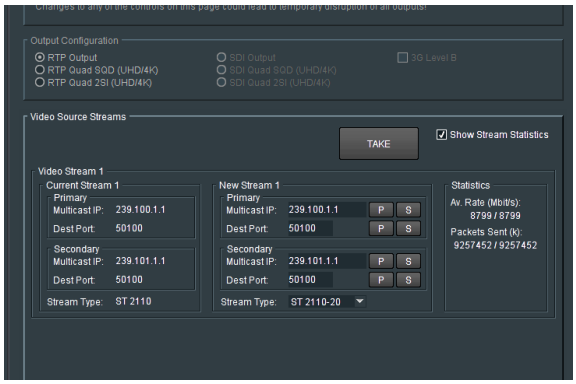
RTP Quad Output (SQD or 2SI)



When the desired output is to be UHD/4K Quadlink, the output may be configured to be either:

- **RTP Quad SQD (UHD/4K)**
- **RTP Quad 2SI (UHD/4K)**

9.8.2 Video Source Streams

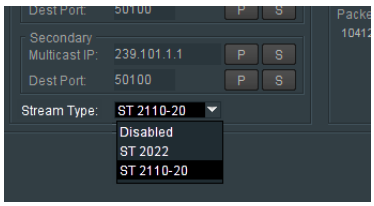


Note: The output video streams of the Alchemist Live are referred to as **Source Streams**. This is because the IP details of the Alchemist Live output represent the source streams of the downstream destination.

The appropriate RTP details are configured in the **Video Source Streams** menu. When the output is SD, HD, 3G, or single stream 4K, transmission is via a single video stream hence only **Video Stream 1** is configured.

The **Current Stream** field will report the current connection. Should the output require reconfiguration, the details of the new source should be entered in the relevant **New Stream** field and the **Take** button pressed to action the change.

Stream Type



The video out may be configured to be either:

- **ST 2022**
- **ST 2110-20**

Alternatively, the output stream maybe disabled.

Note: ST2022 does not support SD resolutions. Hence when the output is SD, the **Steam Type** can only be configured to be ST 2110-20.

RTP Quad Source Streams

Video Streams

When the output is configured to be RTP Quad, all four output Streams (1 to 4) will need to be configured.

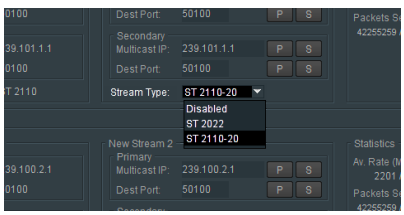
Each output Video Stream is defined by a Multicast IP.

The **Current Stream** field will report the current connection. Should the output require reconfiguration, the details of the new source should be entered in the relevant **New Stream** field and the **Take** button pressed to action the change.

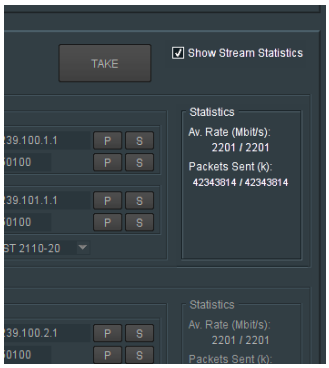
Stream Type

When the output is RTP Quad, the output may be configured to be either:

- **SMPTE ST2022**
- **SMPTE ST2110-20**

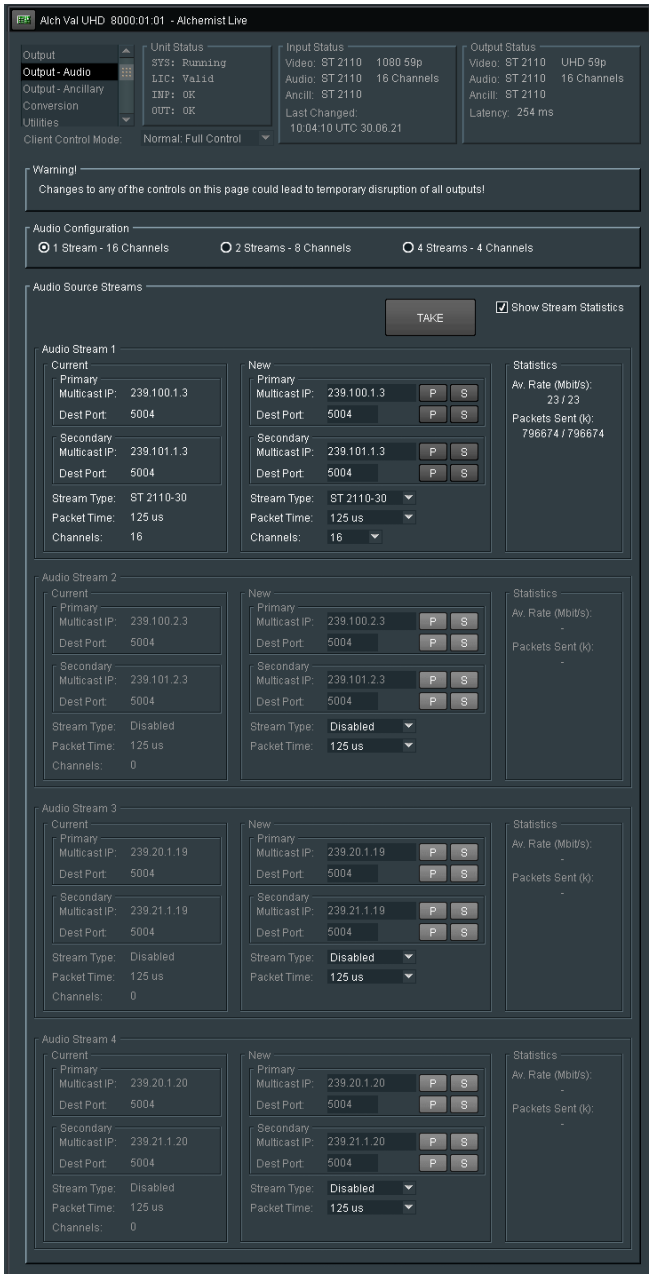


Statistics

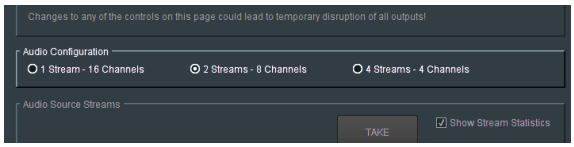


Stream statistics can be show, or hidden, by setting the check-box **Show Stream Statistics.**

9.9 Output - Audio



9.9.1 Audio configuration



Alchemist Live supports up to four output audio streams. The output may be configured to have:

1x Output Audio Stream

When the output is configured to carry a single audio stream, up to 16 channels can be carried.

2x Output Audio Stream

When the output is configured to carry 2 audio streams, each stream must carry 8 audio channels.

If there are insufficient channels in the input to fill the 8 channel per stream requirement, the shortfall will be made up using audio mute channels.

Note: 1ms Packet time is not supported for 2110-31 in this configuration.

4x Output Audio Stream

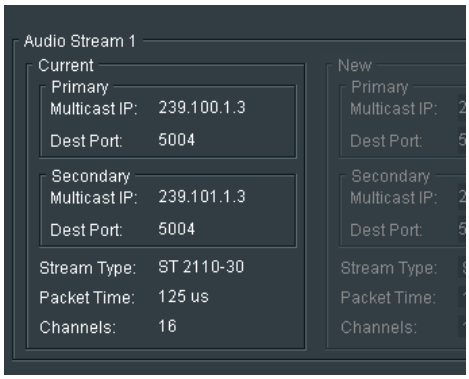
When the output is configured to carry 4 audio streams, each stream must carry 4 audio channels.

If there are insufficient channels in the input to fill the 4 channel per stream requirement, the shortfall will be made up using audio mute channels.

9.9.2 Audio Source Streams

Each output Video Stream is defined by a Multicast IP.

Current Stream



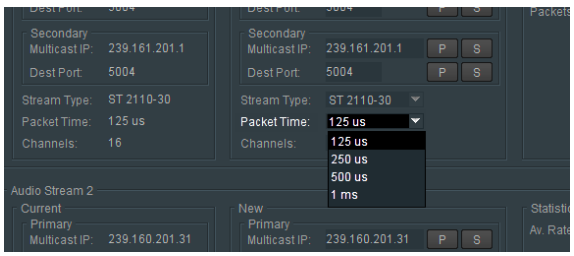
The **Current Stream** field will report the current connection. Should the output require reconfiguration, the details of the new source should be entered in the relevant **New Stream** field and the **Take** button pressed to action the change.

Stream Type

The audio output can be configured to be compliant to either:

- **SMPTE ST 2110-30**
- **SMPTE ST 2110-31**

Packet Time



The audio packet time may be defined using the **Packet Time** control.

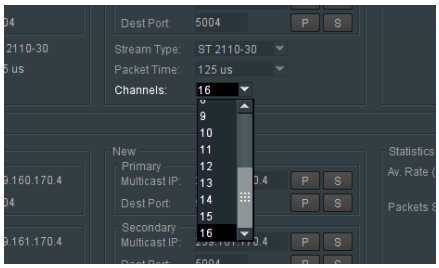
Packet time may be defined to be:

- 125us
- 250us
- 500us
- 1ms

Note – when the output audio is configured to be 2 x 8ch (see section 9.8.1 above) and the stream type is configured to be SMPTE ST 2110-31, that the maximum packet time configurable to is 500us. It is not possible to configure a packet time of 1ms because such a configuration can only support x6 audio channels.

There is no such restriction when the output is configured to be SMPTE ST 2110-30.

Channels



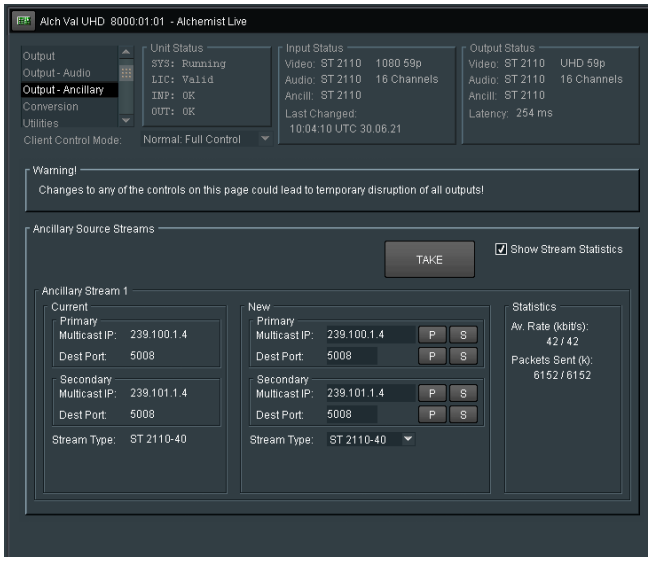
The **Channels** control allows the actual number of channels the specific stream can carry to be defined. The actual number of channels that can be configured will depend upon the **Audio Configuration** (see section 9.9.1, above).

- When a single output stream is configured, up to 16 channels can be set.
- When 2 output streams are configured, each Steam will carry 8 audio channels. Configuration of the number of channels carried is inhibited.
- When 4 output streams are configured, each channel will carry 4 audio channels. Configuration of the number of channels carried is inhibited.

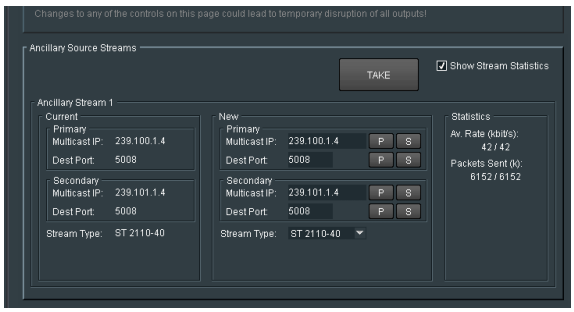
Statistics

Statistics can be configured to be displayed, by checking the **Show Stream Statistics** control.

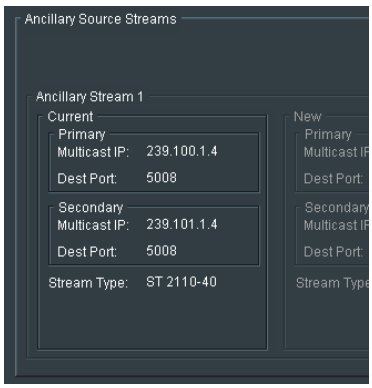
9.9.3 Output - Ancillary



Ancillary Source Streams

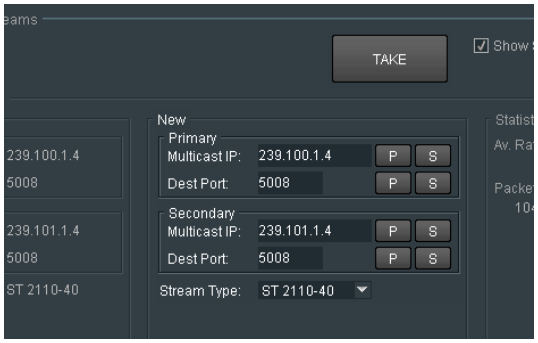


Current



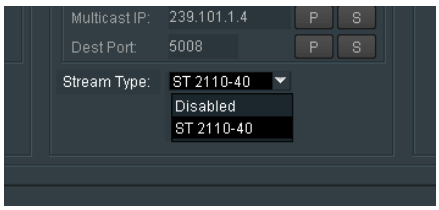
The Current Stream field will report the current connection.

New



Should the input require reconfiguration to a different input, the details of the new input should be entered in the relevant **New** stream field and the **Take** button pressed to action the change.

Stream Type



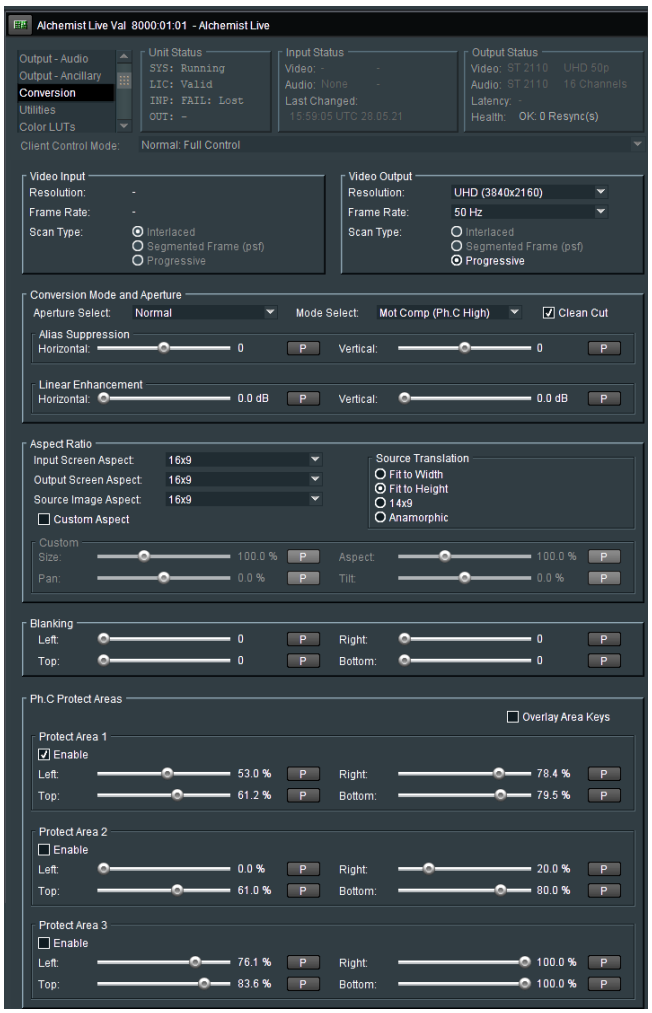
Output Ancillary data, when enabled, will comply to: **ST2110-40**

Output ancillary data can be disabled using the appropriate setting.

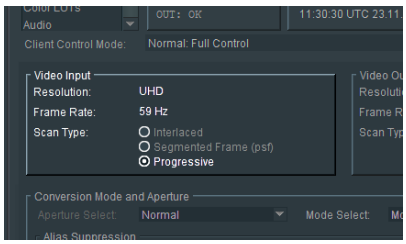
Statistics

Stream statistics can be show, or hidden, by setting the check-box Show Stream Statistics.

9.10 Conversion



9.10.1 Video Input: Interlaced / Segmented Frame (psf) / Progressive



Alchemist Live relies on automatic standards detection of the incoming source signal.

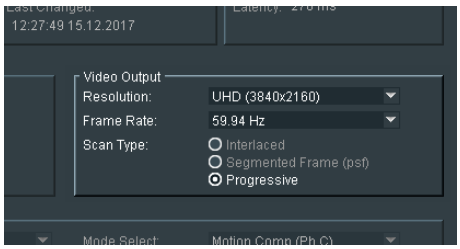
This field reports the detected/configured input video format.

- When the input is Progressive, the **Progressive** input flag will be set and the **Interlaced** and **PsF** flags will be greyed out (not available).
- When the input is interlaced, it will be assumed that the incoming signal is true high frame rate, and the **Interlaced** flag will be set.

If the input is actually **psf**, it will be detected as true high frame rate content. For example, if the input is **1080 25psf**, Alchemist Live will detect the input as **1080 50i** (since the video transport is the same for both). Therefore, in such a scenario, it is important that the **psf** input flag is manually selected.

Note: for optimal conversion performance of psf sources, it is important that the input is identified as psf and not processed as true high frame rate interlaced input.

9.10.2 Video Output: Interlaced / PsF / Progressive

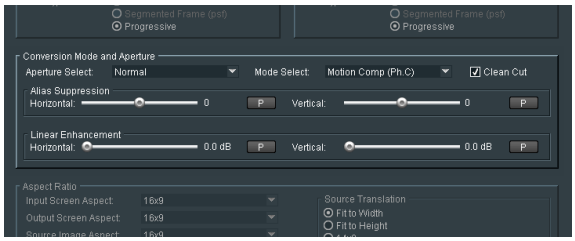


In the **Video Output** field, the output video format can be defined in terms of **Resolution, Frame Rate** and **Scan Type**.

Note: the options offered in the Video Output pane will depend on the settings of the Output Configuration tab (see paragraph 9.8.1 above).

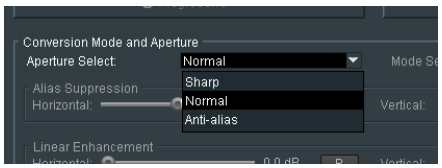
Note: that when the output is configured to be **UHD/4K,** the options: **Interlaced**, and **Segmented Frame (psf)** will be greyed out (not available).

9.10.3 Conversion Mode and Aperture



Aperture Select: Sharp / Normal / Anti-alias

This control can be used to set the appropriate conversion aperture.



Available settings are **Sharp, Normal** & **Anti-alias**. The default setting is **Normal**.

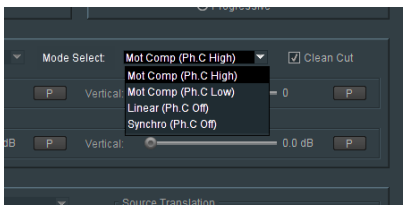
Sharp preserves the most vertical resolution from the input picture.

Normal provides the best compromise for typical input pictures.

Anti-alias is designed to prevent objectionable aliases in the output pictures. Aliasing refers to an artefact associated with sampled signals. This undesirable effect is caused by sampling frequencies being too low to faithfully reproduce the frequencies present in the original source.

Mode Select

This control is used to set the conversion mode.

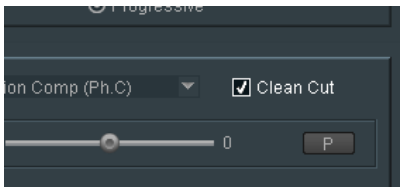


Three modes of operation are available:

- Motion Comp (Ph.C High)
- Motion Comp (Ph.C Low)
- Linear (Ph.C off)
- Synchro (Ph.C off)

Motion Comp (Ph.C High)	is the default and applies Motion Compensated Interpolation when converting from one frame rate to another. As the name suggests, Motion Comp (Ph.C High) performs the highest quality motion compensation conversion.
Motion Comp (Ph.C Low)	is a less aggressive form of PhC motion compensation. In circumstances were Ph.C High may introduce unacceptable conversion artefacts associated with certain source content. Examples may include: ▪ burnt in captions over complex moving content ▪ object periodics ▪ fixed transparent logos or captions over complex moving content ▪ scrolling captions over complex moving content
Linear (Ph.C off)	disables the Motion Compensation, and employs a linear interpolation when converting from one frame rate to another.
Synchro (Ph.C off)	converts from one frame rate to another, by dropping or repeating input pictures as required. Depending on the conversion requested, field or frame based synchronise events could occur.

Clean Cut



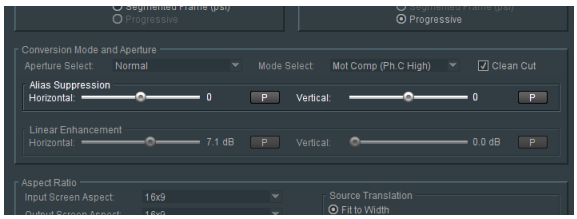
This control allows the User to configure the **Clean Cut** feature to be either *enabled* or *disabled*.

Default setting is: **Enabled**

Alias Suppression: Horizontal / Vertical

The **Alias Suppression** feature allows the User to manually increase, or decrease, the magnitude of alias suppression.

Separate horizontal and vertical controls are available.



Two slider controls are offered. Default setting is zero.

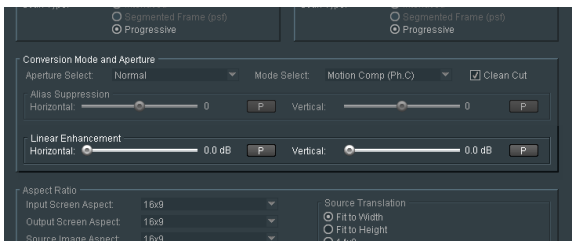
Positive settings increase alias suppression.

Negative settings decrease suppression.

Alias Suppression should be used to balance ‘perceived resolution’ against unwanted aliasing.

Linear Enhancement

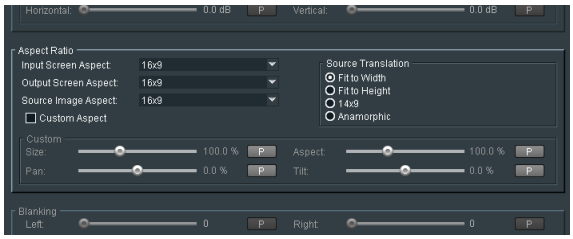
The **Linear Enhancer** feature allows the User to increased perceived sharpness. Separate horizontal and vertical controls are available.



Note that the effectiveness of the **Linear Enhancer** is affected by the chosen settings of the **Alias Suppression** controls.

9.10.4 Aspect Ratio: various

The user can specify aspect ratio translations using either the drop down pre-sets, or the custom settings.



ARC controls include:

- **Input screen aspect**
- **Output screen aspect**
- **Source image aspect**
- **Source translation** (to output)

Input Screen Aspect

Input Screen Aspect is used to describe the source screen input aspect ratio by selecting the relevant setting from the drop down list:

Output Screen Aspect

Output Screen Aspect is used to describe the output screen aspect ratio from the drop down list.

Source Image Aspect

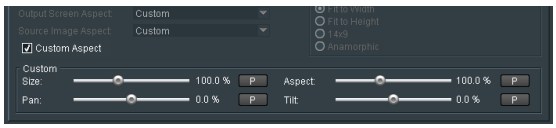
The **Source Image Aspect** control is used to define the aspect ratio of the active image within the input screen aspect.

Source Translation

The **Source Translation** control is used to describe the translation required from source to output image.

Custom Aspect

The **Custom** controls can be enabled to activate the custom display setting sliders, using the **Custom Aspect** checkbox.



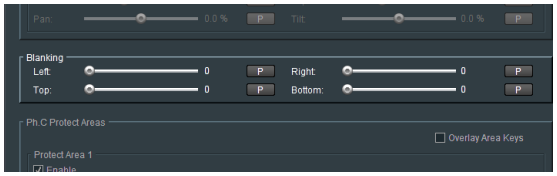
The controls: **Size**, **Pan**, **Asp** and **Tilt** can now be used set any desired **display** settings.

Note: an Application Note is available called **How to Configure the ARC (Aspect Ratio Converter).**

This App Note offers a more in depth explanation of this Alchemist Live feature and may be downloaded from the GV Website here:

App note - How To Configure the ARC - download.

9.10.5 Blanking: Left / Right / Top / Bottom



The **Blanking** slider controls allow the User to blank areas of the output image. Blanked areas will appear black in the output image.

9.10.6 Ph.C Protect Areas

The **Ph.C Protect Areas** feature allows up to three separate areas of the processed picture to be excluded from the Ph.C process. Fixed objects like Logos or static text will be protected from motion prediction artefacts that can be associated with Ph.C frame rate conversion.

Protect Area 1, 2, & 3

Each of the three areas can be configured as a rectangle, which will be defined by the four controls:

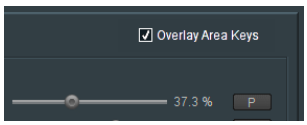
- Left,
- Right
- Top
- Bottom

The feature can be enabled using the relevant **Enabled** button:

Note:

- The **Right** control must be a higher percentage setting than the **Left** control.
- The **Bottom** control must be a higher percentage setting than the **Top** control.

Overlay Area Keys



When enabled the defined areas of the configured keys will be shown on the output video picture.

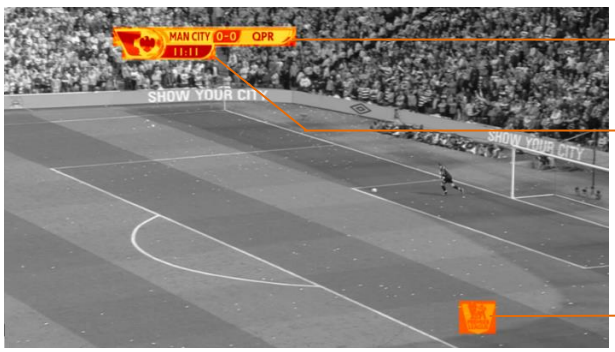
- Ph.C active areas will be detailed by areas shown in monochrome.
- Non-Ph.C areas (where linear conversion will take place) will be detailed by areas shown in red.

Each Key will describe a rectangular protected area.

In the following example, a single protected area is defined by the key: **Protected Area 1**

Defined PhC inactive areas

Multiple keys can be configured to create more complex shapes, or to protect multiple objects:



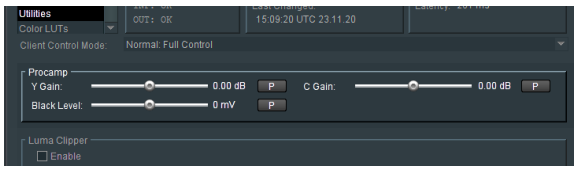
Protected Area 1

Protected Area 2

Protected Area 3

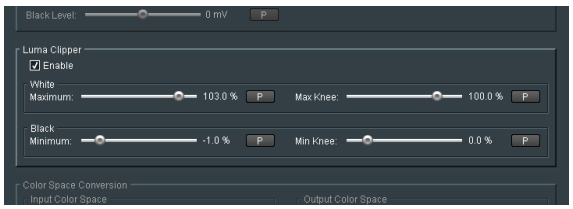
9.11 Utilities

9.11.1 Proc Amp: Y Gain / C Gain / Black Level



- The Luma gain may be adjusted using the slider control **Y Gain.** The range is +/- 6dB.
- The Chroma gain may be adjusted using the slider control **C Gain**. The range is +/- 6dB.
- The Black level may be adjusted using the slider control **Black Level.** The range is +/- 80mV.

9.11.2 Luma Clipper: White Max / White Knee / Black Min / Black Knee

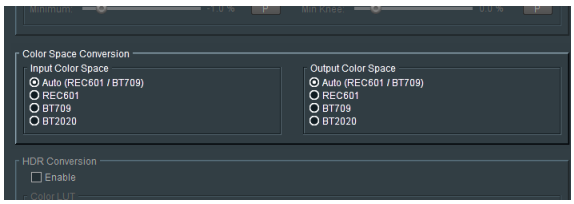


The Luma Clipper feature is enabled with the tick box.

The default setting is *disabled.*

When **Enabled,** the controls: **White Maximum**, **White Knee**, **Black Minimum** and **Black Knee** all become active and may be configured.

9.11.3 Color Space Conversion: Auto / REC601 / BT709 / BT2020

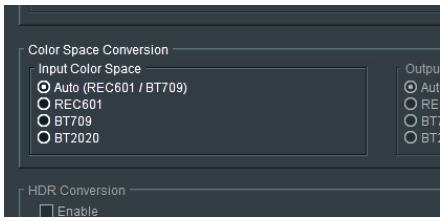


Input Color Space

In **Auto** mode, if the input is:

- SD, it will be assumed that the source complies with REC601.
- HD, it will be assumed that the source complies with BT709.
- UHD/4K, it will be assumed that the source complies with BT709.

The User can manually force the desired **Input Color Space** setting. This is important when inputting sources compliant to BT2020, as currently there is no automatic signalling present.

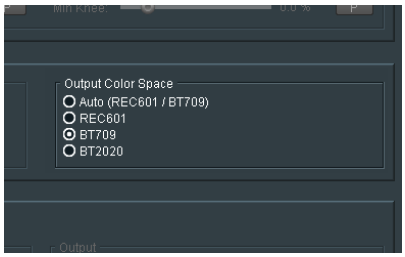


Output Color Space

In **Auto** mode, if the output is:

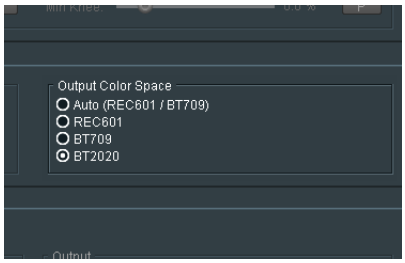
- SD, it will comply with REC601.
- HD, it will comply with BT709.
- UHD/4K, it will comply with BT709.

The User may choose to manually force the desired **Output Color Space** setting.

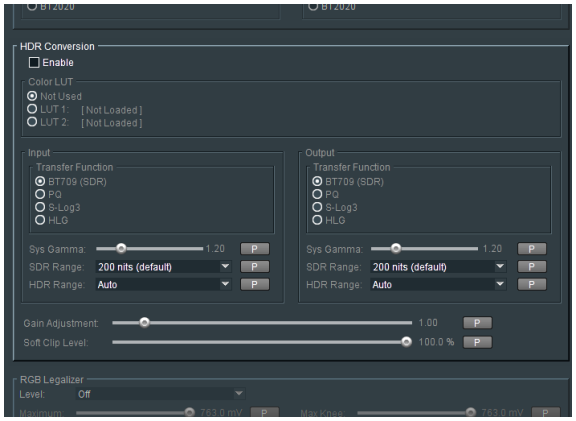


If it is desired that the output be BT2020, then the control should be set to:

- BT2020



9.11.4 HDR Conversion



Alchemist Live supports HDR processing.

Supported transfer functions are:

- BT709 (SDR)
- PQ
- S-Log 3
- HLG

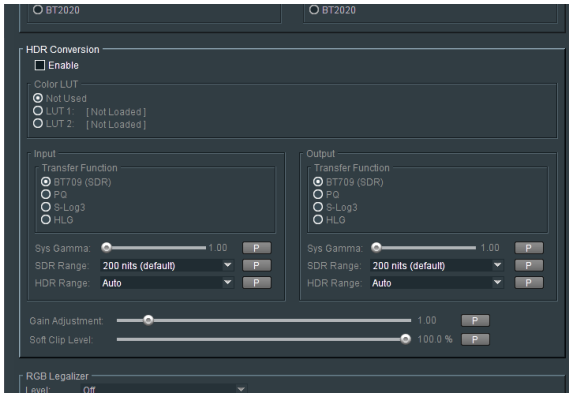
Note: although HDR10 doesn't appear in the menu, HDR10 employs the same HDR curve as PQ, hence HDR10 content can be processed by configuring as PQ.

Alchemist Live supports the following conversion modes:

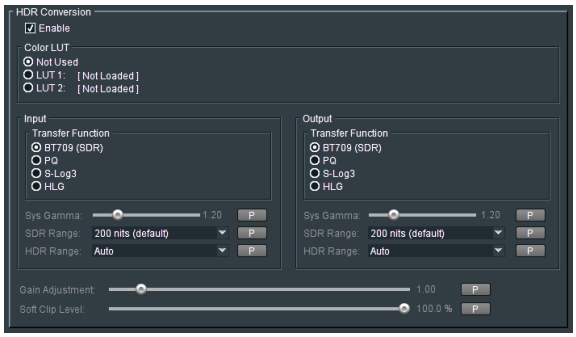
- Conversion from HDR to SDR
- Conversion from SDR to HDR
- Retention of HDR
- Translation of HDR

Enable

Note that in its default state, the **HDR Conversion** menu is disabled.

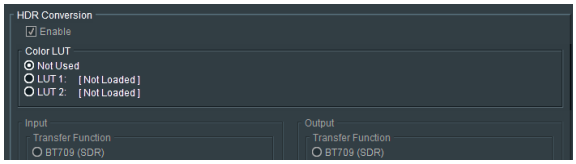


To make the controls active it is first necessary to configure the checkbox: **Enable**



Once enabled, the **HDR Conversion** menu will become active.

Color LUT



Introduced in V2.1.0.20 Alchemist Live supports Custom LUTs (Look Up Tables).

LUT files should be in the form of *.cube*

The procedure of loading LUTs into the Alchemist Live system is described in the Color LUTs menu described in Section 3 below.

A LUT will describe the overall characteristic from input to output.

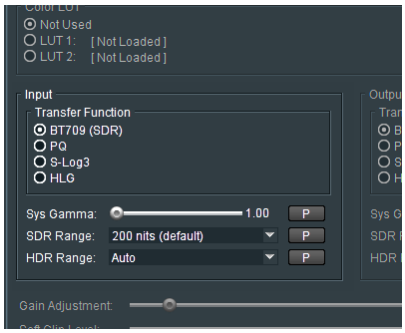
The LUT will take priority over the setting of **Input Transfer Function** and **Output Transfer Function.**

Once **LUT 1** and **LUT 2** are loaded, they will appear in the Color LUT menu.

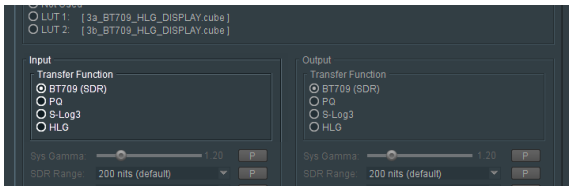
Up to two LUTs can be loaded at a time. Either LUT can be easily applied to a particular conversion process.

Alchemist Live can store many LUTs, but only two may be loaded into the LUT Cache (in the Color LUT menu) at a time.

Input



Transfer Function (Input)



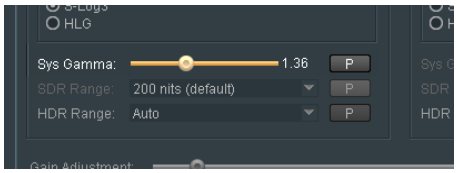
The **Input** control allows the Operator to define the input with respect to HDR.

If an SDR to HDR process is to be configured, the input should be defined as: **BT709 (SDR).**

The default setting is: **BT709 (SDR)**

.

System Gamma (Input)



This control is only active when the input HDR standard is defined to be either HLG or S-Log3.

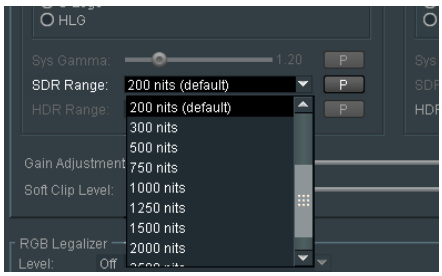
It is not relevant for inputs that conform to PQ, or SDR formats and the control will be greyed out.

When active, **Input System Gamma** may be defined to a value between 1.0 and 2.0.

The default setting is: 1.2

Note – this is an input control and defines the brightness of the HDR input. A higher setting will result in a darker output picture.

SDR Range (input)



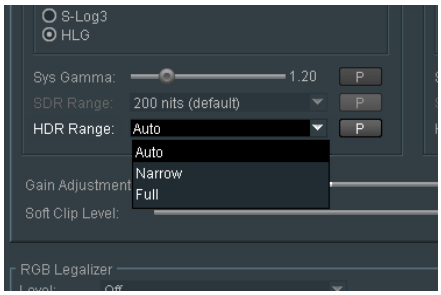
This control is only active when the conversion mode is SDR to HDR. The control is used to define how bright the SDR input is. The desired setting can be configured using the drop-down menu.

The range of the control is: 20 to 3000 nits.

The default value is: 200 nits

Note - The higher the nit level set, the brighter the output picture will be.

HDR Range (input)



This control is only active when the input is defined to be HDR compliant. The HDR Range may be set to **Auto**, **Full** or **Narrow**, using the drop down menu.

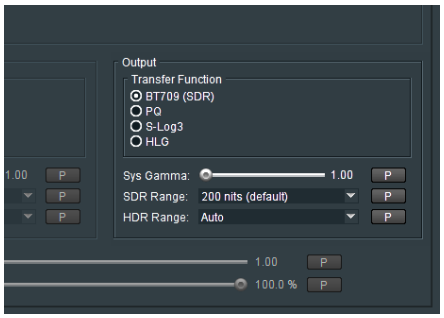
In **Auto** mode outputs compliant to:

- PQ will be set to **Full**
- HLG will be set to **Narrow**
- S-Log3 will be set to **Narrow**

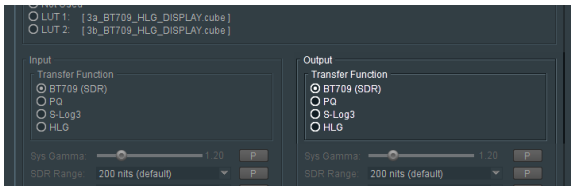
When set to **Full,** sub-blacks and super-white luminance values are included.

When set to **Narrow,** sub-blacks and super-whites are clipped.

Output



Transform Function (output)



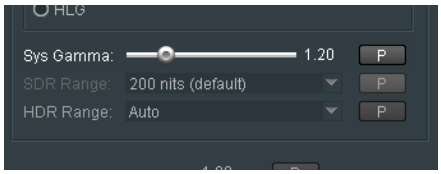
The output control allows the Operator to define the output with respect to HDR.

If an HDR to SDR process is to be configured, the output should be defined as: **BT709 (SDR).**

The default setting is**: BT709 (SDR)**

Note: if it is a requirement that the output conform to HDR10, the output should be set to PQ. PQ and HDR10 employ the same HDR curve so setting PQ will effectively make the output compliant to HDR10

System Gamma (output)



This control is only active when the Output HDR standard is defined to be either HLG or S-Log3.

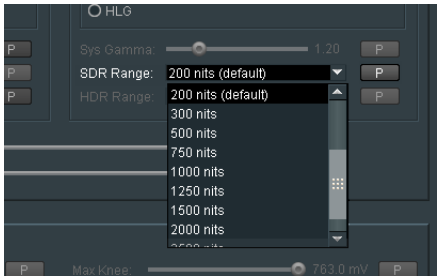
It is not relevant for outputs that conform to PQ, or SDR formats and the control will be greyed out.

When active, **Output System Gamma** may be defined to a value between 1.0 and 2.0.

The default setting is: 1.2

Note: this is an output control and a higher setting will result in a brighter output picture.

SDR Range (output)



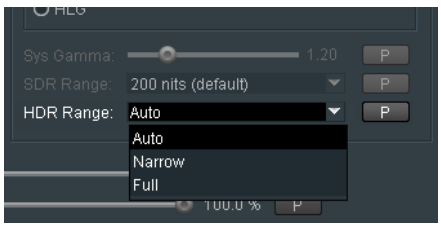
This control is only active when the conversion mode is HDR to SDR. The control is used to define the SDR brightness of the output.

The range of the control is: 20 to 3000 nits.

The default value is: 200 nits

Note – somewhat unintuitively, the higher the nit level set, the darker the output picture will be.

HDR Range (output)



This control is only active when the output is defined to be HDR compliant. The HDR Range may be set to **Auto**, **Full** or **Narrow**, using the drop down menu.

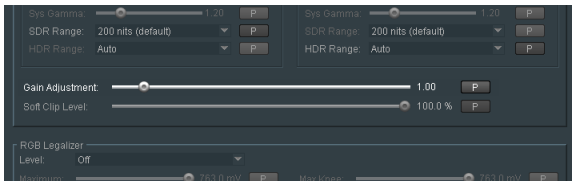
In **Auto** mode outputs compliant to:

- PQ will be set to **Full**
- HLG will be set to **Narrow**
- S-Log3 will be set to **Narrow**

When set to **Full,** sub-blacks and super-white luminance values are included.

When set to **Narrow,** sub-blacks and super-whites are clipped.

Gain Adjustment



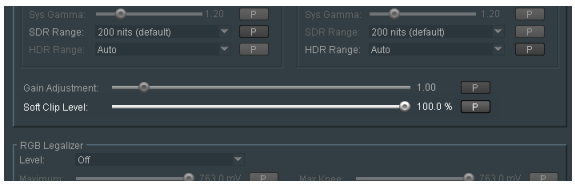
Gain Adjustment: this control allow the User to adjust the brightness of the output picture.

The control scale is 0.1 to 10.00

Default value is 1.00

Setting a higher value will make the output picture brighter.

Soft Clip Level



The **Soft Clip Level** control scale is 60 to 100%

Default value is dependent upon the conversion being performed:

If the process is:

- SDR to HDR, the default values is: 100%
- HDR to SDR, the default values is: 80%
- HDR to HDR, the default values is: 100%

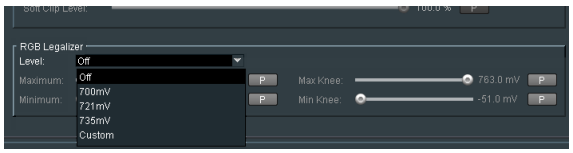
Note that if the conversion mode configured is: BT709 (SDR) to BT709 (SDR), these controls will be unavailable (greyed out).

The effect of the White Clip control is to increase detail in the high luminance areas of picture. This maybe important when there are high luminance levels in the source

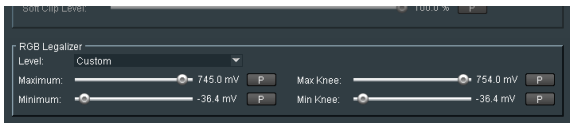
9.11.5 RGB Legalizer: Off / 700mV / 721mV / 735mV / Custom

The default setting of the RGB Legalizer is: **Off**

Three preset settings are offered for the RGB Legalizer **Level** control: 700mV, 721mV or 735mV. These can be selected using the drop-down menu.

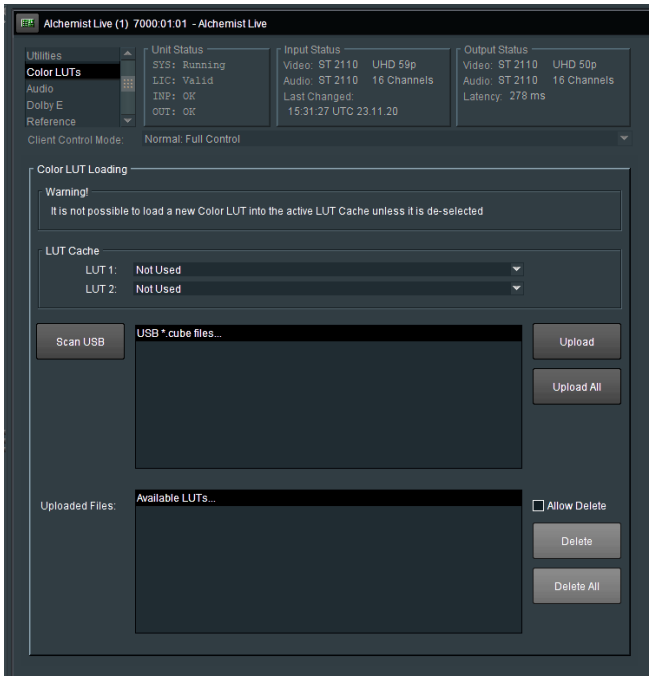


Alternatively, a **Custom** setting can be configured. When set to **Custom,** the custom controls become active allowing the User to set any combination of values:



Note: an expanded description of the RGB Legaliser is offered in **Appendix D** below.

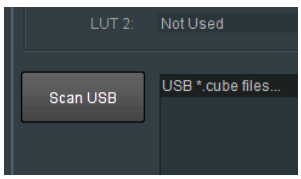
9.12 Color LUTs



The **Color LUTs** menu is used to load LUTs.

LUTs in the form of a *.cube* file, are loaded from a USB Drive inserted into the Alchemist Live mainframe.

Scan USB

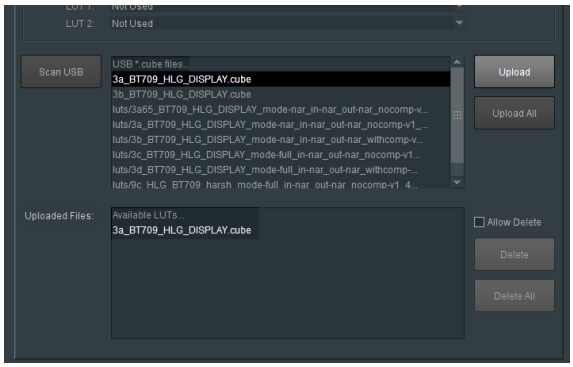


When pressed, the inserted USB Drive will be scanned. Any LUTs tables in the form of *.cube* files, will appear in the **USB *.cube files…** field:

A LUT may be selected in the **USB *.cube files…** field.

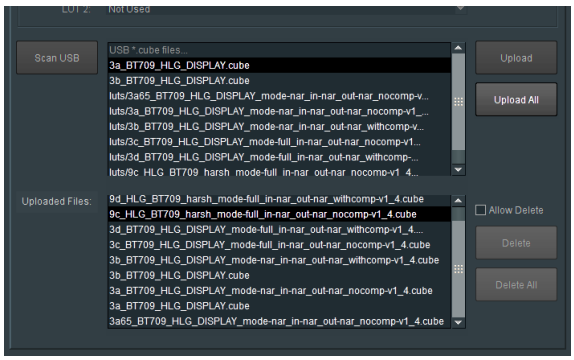
Upload

Pressing the **Upload** button will result in the selected LUT appearing in the **Available LUTs** field.



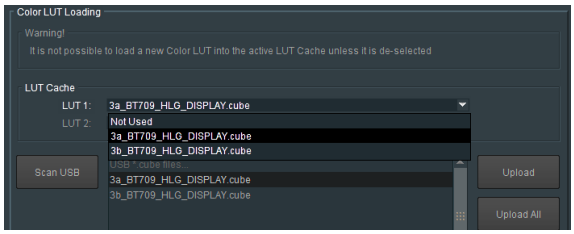
Upload All

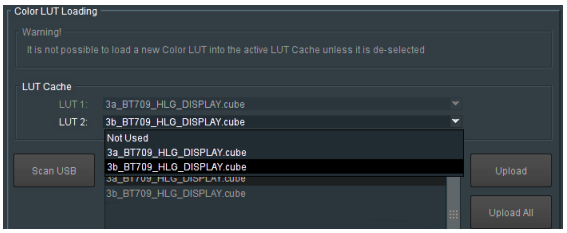
Pressing the **Upload All** button will result in all the available LUTs appearing in the **Available LUTs** field.



LUT Cache

A LUT may be assigned to either the **LUT 1 Cache** or **LUT 2 Cache**, using the associated drop down menu:

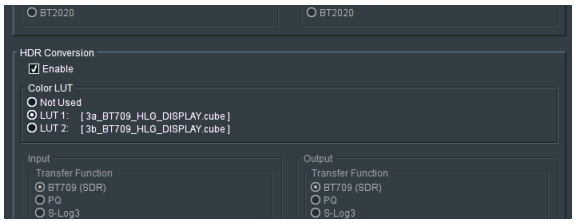




Note 1 – the same LUT cannot be loaded into both LUT 1 Cache, or LUT 2 Cache at the same time.

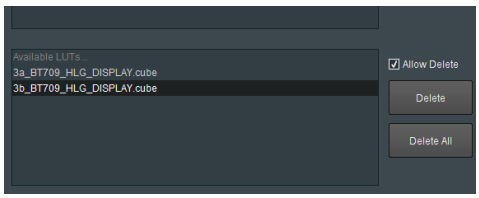
Note 2 – a LUT in the LUT Cache cannot be changed if it is active in the HDR Conversion menu.

The LUT may be applied to a conversion by selecting it in the **Utilities/HDR Conversion** menu:



Delete

LUTs maybe deleted from the Available LUTs field, by first selecting the LUT to be deleted, then checking the **Allow Delete** box and then pressing the **Delete** button:



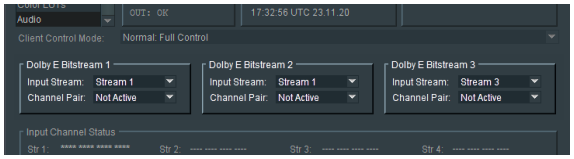
9.13 Audio

Alchemist-Live IP supports 16 channels of audio.

Audio features include:

- Audio Routing
- Audio Channel Mapping
- Audio Gain
- Audio Delay
- Tone Generation.
- Dolby E Transcode (option)

9.13.1 Dolby® E Bitstream *



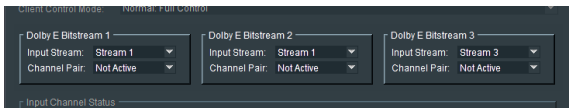
The Dolby E feature for the IP variant of the Alchemist Live, is introduced in V3.

Dolby E is a licenced optional feature. A license may be obtained to allow transcoding of either one, two, or three Dolby E bitstreams.

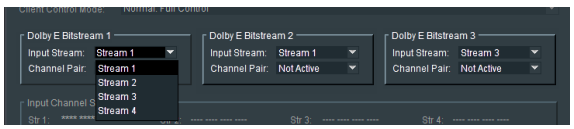
When Alchemist Live IP is configured to be a single channel converter, up to three Dolby E bitstreams can be transcoded.

When Alchemist Live IP is configured to be a three channel converter, each channel can transcode a single Dolby E bitstream.

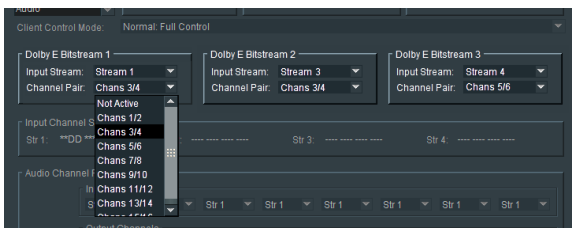
Single Channel Mode



The input audio stream(s) carrying the Dolby E bit-stream(s) can be defined using the relevant **Input Stream** drop-down menu:

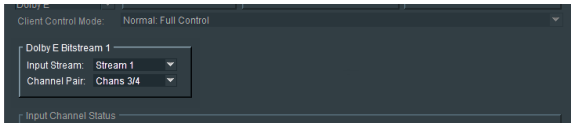


The specific input channels carrying the Dolby E bit-stream can be defined using the **Channel Pair** drop-down menu:



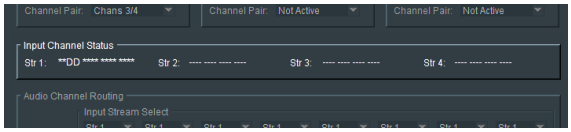
Three Channel Mode

When Alchemist Live IP is configured as a three channel system, each channel supports the passing of a single Dolby E bitstream:



***Dolby -** Dolby is a registered trademark of Dolby Laboratories.*

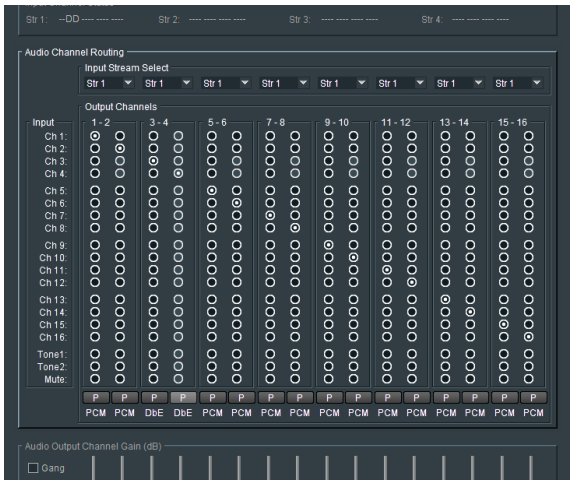
9.13.2 Input Channel Status



The **Input Channels Status** menu displays the actual audio present in the selected input stream.

In this example shown here, Stream 1 has 16 channels of audio, with channels 3/4 carrying a Dolby E bitstream.

9.13.3 Audio Channel Routing



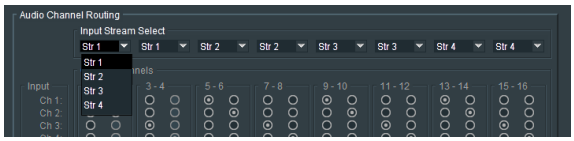
The **Audio Channel Routing** matrix allows routing of input audio channels, from any input stream, to any output audio channel, in any output stream.

Although an input audio stream can contain up to 64 audio channels, only audio channels from the top 16 can be chosen to be routed. Any input audio channels below the top 16 will be discarded.

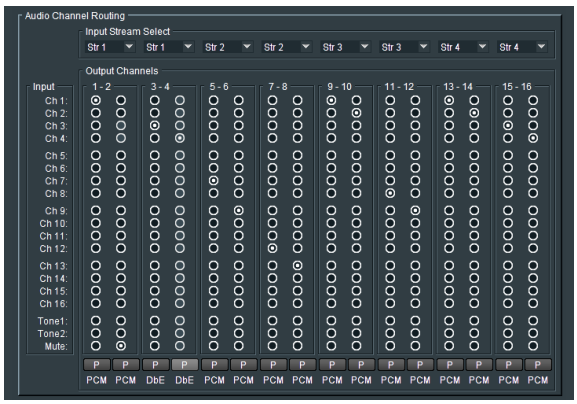
Note that the number of output streams is defined in the **Output Audio** menu (section 9.9.1 above).

- When the output is configured to have a single output audio stream, all 16 output audio channels will be routed to the output stream.
- When the output is configured to have two output streams, output channels 1 to 8 will be routed to output audio stream 1, and output channels 9 to 16 will be routed to output audio stream 2.
- When the output is configured to have four output streams, output channels 1 to 4 will be routed to output audio stream 1, output channels 5 to 8 will be routed to output audio stream 2, output channels 9 to 12 will be routed to output audio stream and output channels 13 to 16 will be routed to output audio stream 4.

Input Stream Select



The source stream for each output audio pair is defined using the relevant drop-down menu.

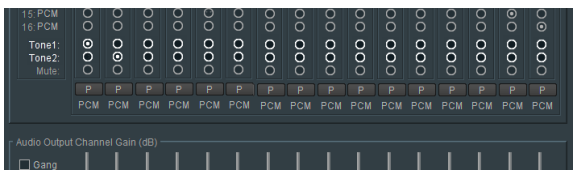


Example of a custom audio routing configuration

Each Audio route can be set to its default setting by pressing the associated ‘P’ (preset) button.

Tone Generator

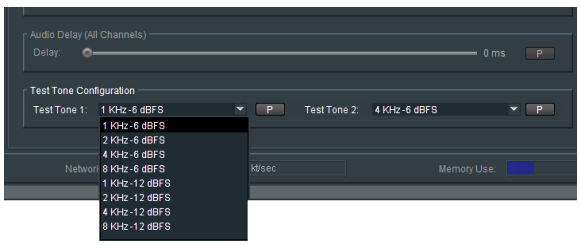
Alchemist Live has two tone generators. Each output audio channel can be configured to be either tone:



In this example:

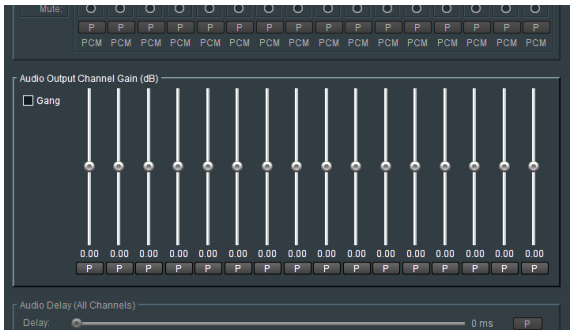
- output audio channel 1 has been configured to be **Tone1**
- output audio channel 2 has been configured to be **Tone2**

The tones generated by **Tone1** and **Tone2** can be configured in the **Test Tone Configuration** field:

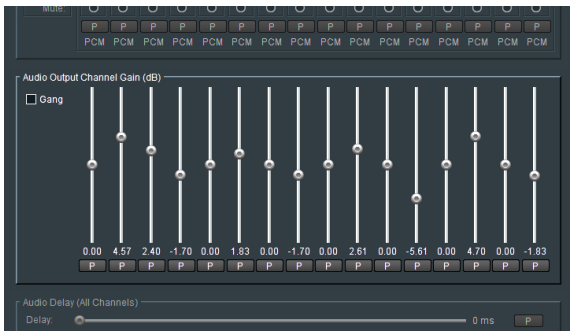


Tones may be configured with various frequencies and levels.

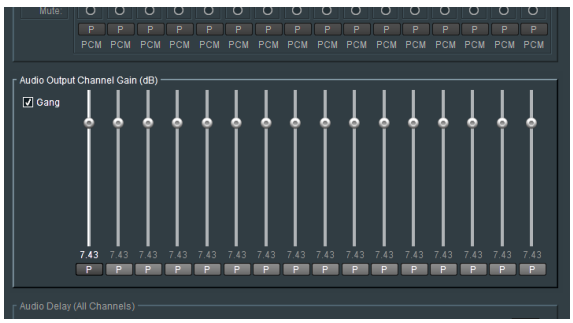
9.13.4 Audio Output Channel Gain (dB)



Each audio output channel has its own associated gain control slider, meaning each output audio channel can be configured with a specific audio gain.



Alternatively, the gain controls can be ‘ganged’ enabling a global gain setting to be applied:



Each channel has an associated preset button **P.** When selected, the audio gain will return to unity.

9.13.5 Audio Delay (All Channels)

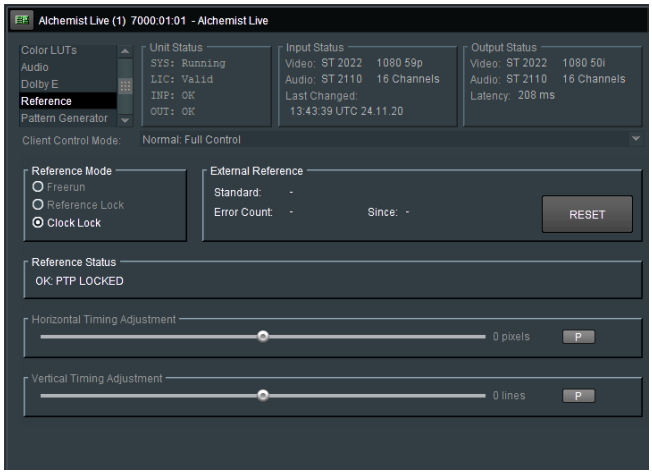
The **Delay** control allows a global delay to be applied to all audio channels. The control will delay audio relative to video.

The delay may be configured to be between 0ms to 500ms.

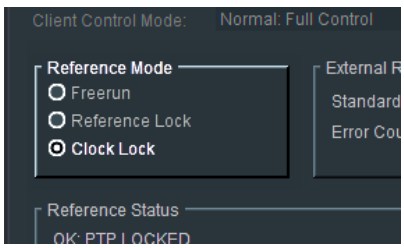
Default setting is: 0ms

Pressing the preset button **P** will apply the default setting.

9.14 Reference



9.14.1 Reference Mode



Currently, there is only a single reference mode relevant to the Alchemist Live IP: **Clock Locked**.

In circumstances where the input frame rate is different from the output frame rate, the locking condition will be ‘clock-locked’.

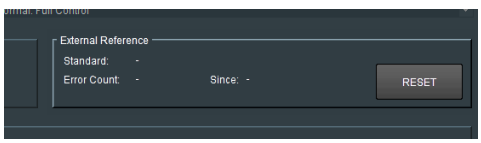
Clock-lock example: if the Alchemist Live is converting 50 fps to 60 fps, then 50 frames of input will exactly align with 60 frames of the output.

Note: Clock Locked – The system is locked successfully to the PTP Source

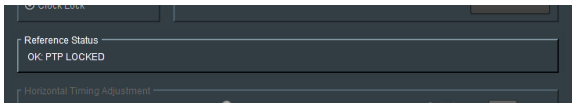
Note: the modes **Freerun** & **Reference Lock** are only relevant to the SDI variant of Alchemist Live, hence they are disabled (greyed out).

9.14.2 External Reference

This menu is only relevant to the SDI variant of Alchemist Live, hence nothing is reported here.



9.14.3 Reference Status

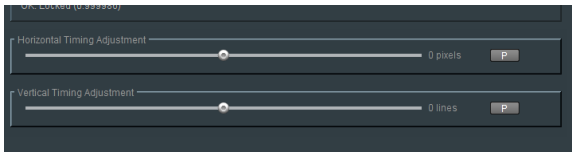


A successful locked condition will be identified in the **Reference Status** pane, as: **Locked**

The actual lock condition will depend on configuration of the **Time Sync Mode** menu, in the **Time Sync Configuration** template (see section 8.2 above).

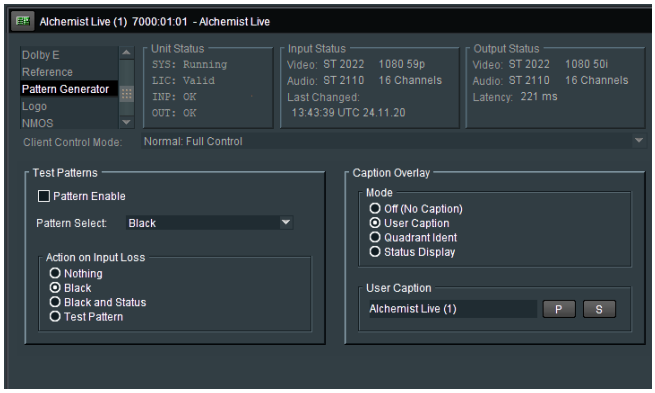
In the example shown here, the system is locked to a PTP clock, hence **OK: PTP LOCKED** is reported.

9.14.4 Genlock Timing

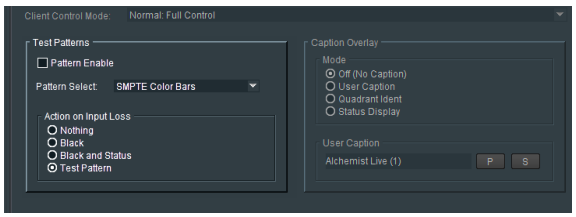


This menu is only relevant to the SDI variant of Alchemist Live, hence these controls are inactive.

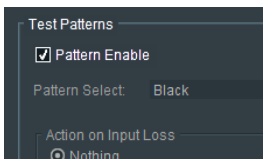
9.15 Pattern Generator



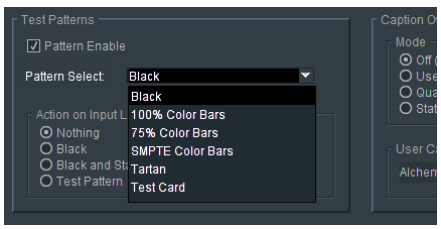
9.15.1 Test Patterns



The test pattern generator is enabled using the **Pattern Enable** check box:

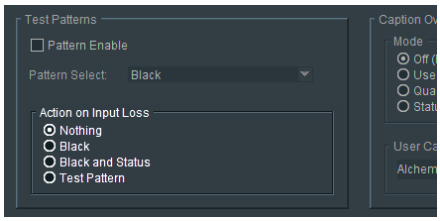


Pattern Select



The required pattern can be configured using the drop-down menu.

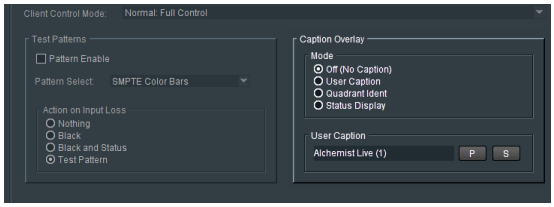
Action on Input Loss



The **Action on Input Loss** control allows the Operator to configure the output in the event of the input becoming lost.

Should the setting be: **Black and Status**, upon loss, the output will cut to a black field, with a caption indicating input loss:

9.15.2 Caption Overlay



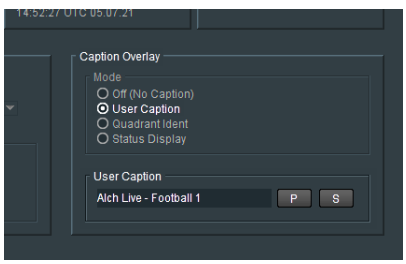
The **Caption Overlay** feature allow the Operator to easily identify the downstream transmission path.

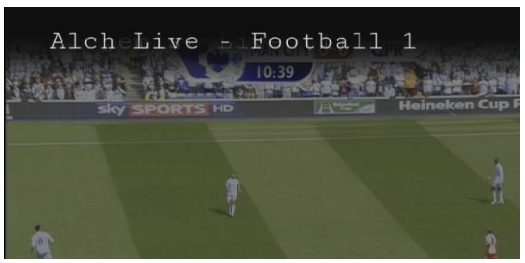
Mode – Off (No caption)

The default mode is **Off.** No caption is inserted in the output.

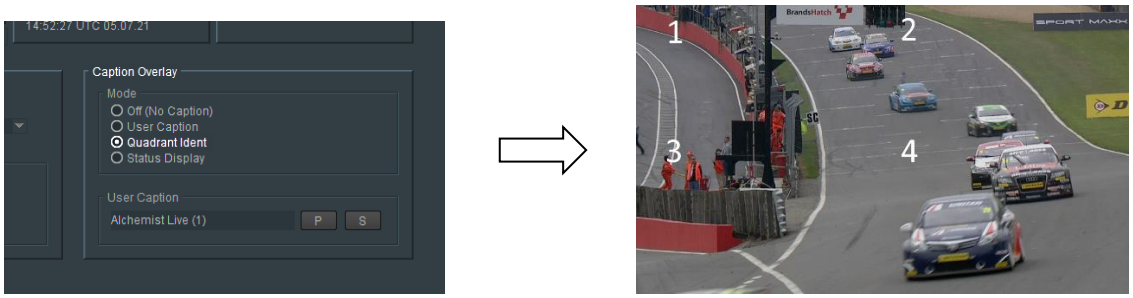
Mode - User Caption

If required, the caption can be changed to something more meaningful:





Mode – Quadrant Ident

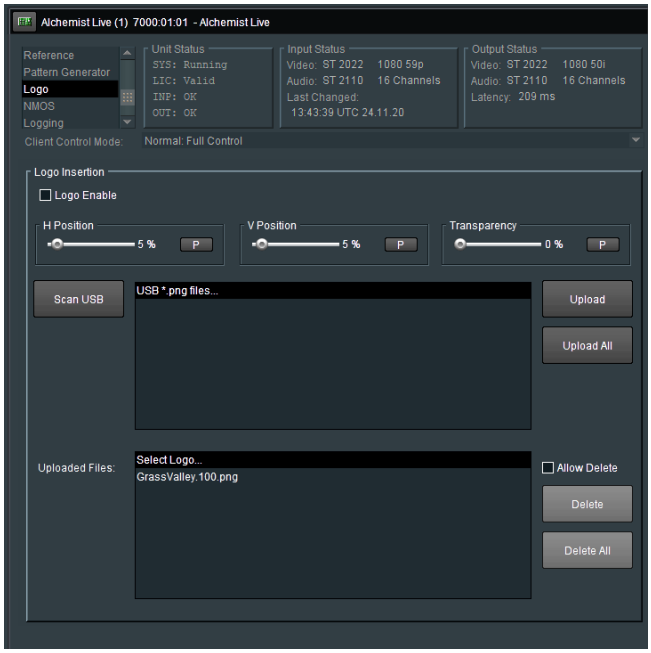


When the output is UHD SQD or 2SI or 4K.

Mode – Status Display

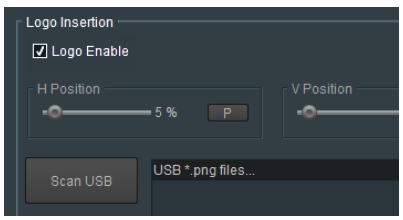
When enable, the **Status Display** feature will insert text describing the current conversion configuration.

9.16 Logo



9.16.1 Logo Insertion

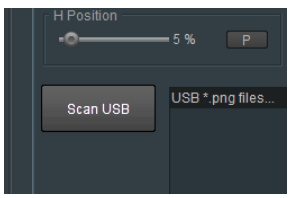
Logo Enable



Logo insertion into the output video stream is activated using the: **Logo Enable** control.

The default setting is: **Disabled**.

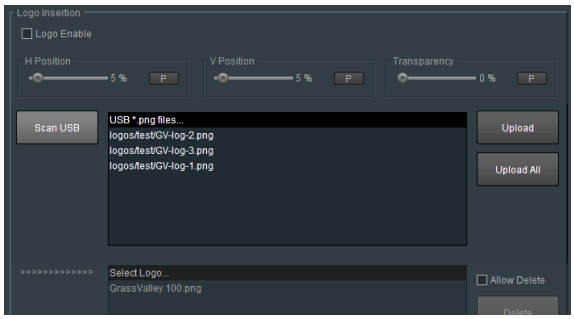
Scan USB



Logos are imported to the Alchemist Live system via a USB Drive.

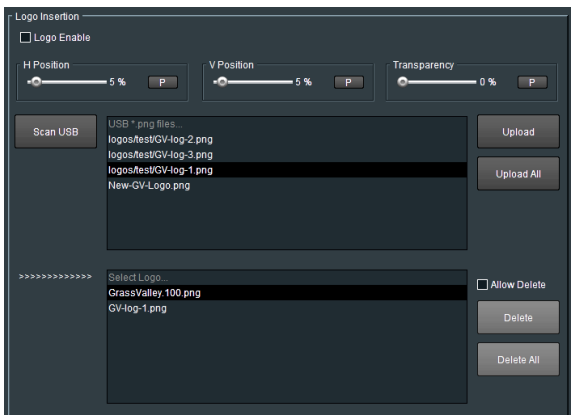
Logo should be in the form of a .png file.

Any .png files present on the USB drive will appear in the top pane, when the USB is scanned:

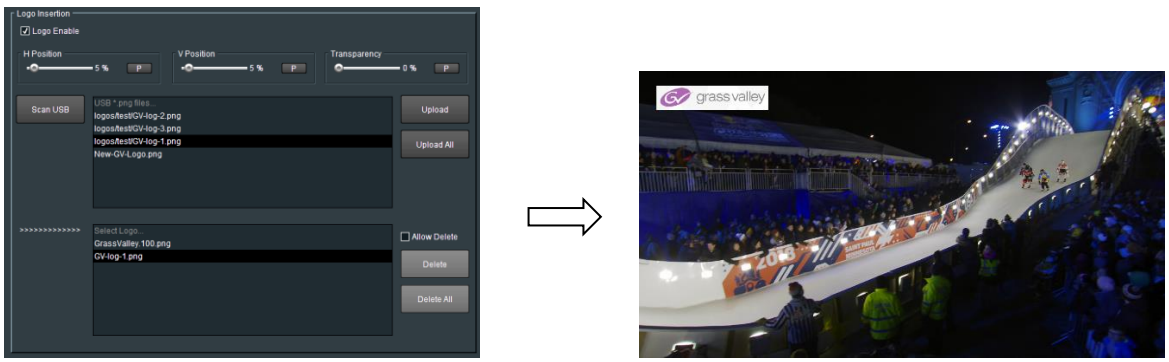


Any logo file appearing in the left pane can be uploaded to the Alchemist System by selecting the appropriate logo file and pressing the Upload button.

The Logo file will now appear in the lower pane:

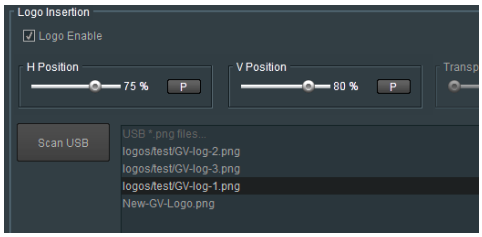


Any logo appearing in the lower pane can be selected and then inserted into the output picture by checking the **Logo Enable** control:



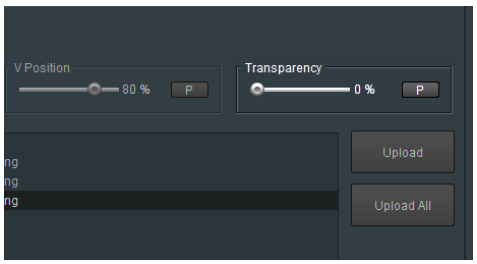
H Position & V Position

The position of the inserted Logo may be adjusted using the **H Position** and **V Position** controls.



Transparency

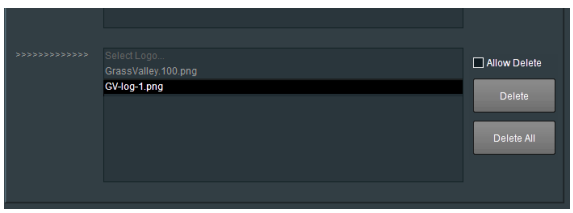
The transparency of the inserted logo may be adjusted using the **Transparency** control:



Note that the resolution of the Logo .png file, will dictate the size of the logo on screen.

Example – a logo with a resolution of 100 x 50 pixels, will be 100 pixels wide and 50 lines high, within the output video raster.

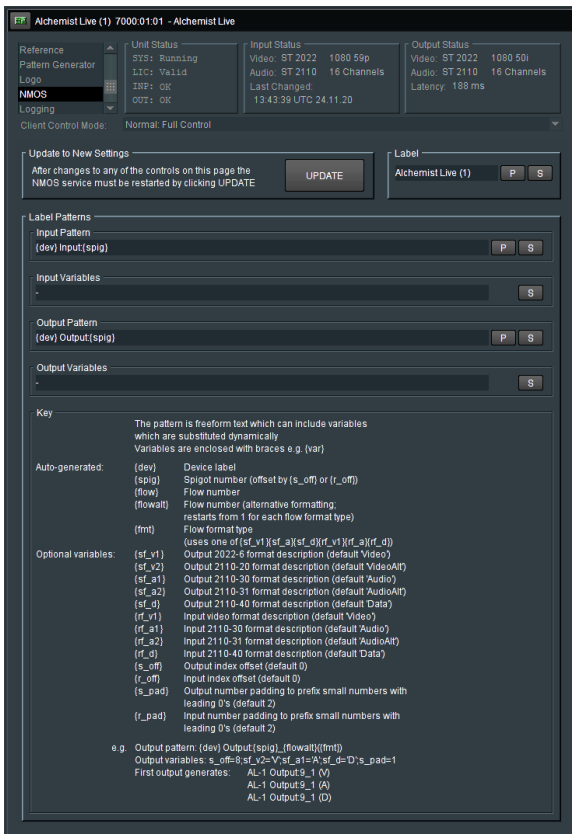
Delete



Any logo appearing in the **Select Logo** pane may selected and deleted using the **Delete** button.

All the logos appearing in the **Select Logo** pane may be deleted by selecting the **Delete All** button

9.17 NMOS



With the release of Version 3 software, Alchemist Live now supports NMOS.

Currently Alchemist Live supports IS04 and IS05 parts of the standard.

- IS04 - Discovery and Registration
- IS05 - Connection Management

The NMOS feature allows for discovery of devices/systems with their capabilities, register then (IS-04) and from that the connectivity of devices/systems (IS-05).

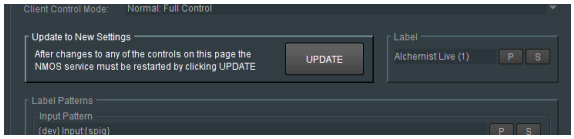
The **Pattern Labelling** of the GV Live Host will be migrated to the Alchemist Live NMOS menu. This means that in circumstances where the Alchemist Live is configured to be a 3x channel processor, it is not required to configure all three NMOS channels separately.

The NMOS configuration of the Agent will override the NMOS configuration of the Alchemist Live Host.

At the NMOS Agent level, it is possible to:

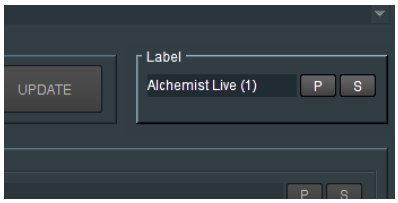
- Give set the labels to the Agents so they can be named and that helps identification within the registry. By default they are unique within the Alchemist Live :Alchemist Live (1), Alchemist Live (2), Alchemist Live (3), for 3x HD Agents or 1x UHD Agent it is (Alchemist Live (1)) but it the environment has multiple Alchemist Live system then each server should have unique Labels set to help operationally.
- By default each Agent inherits the Label Patterns set on the Host NMOS menu but you can create more specific Label Patterns on each Agent to identify the Alchemist Live connections. The Agent Label Patterns take priority over the Host Label Patterns.

9.17.1 Update to New Settings



If any changes are made to NMOS settings, the NMOS Service will require restarting, using the **UPDATE** button.

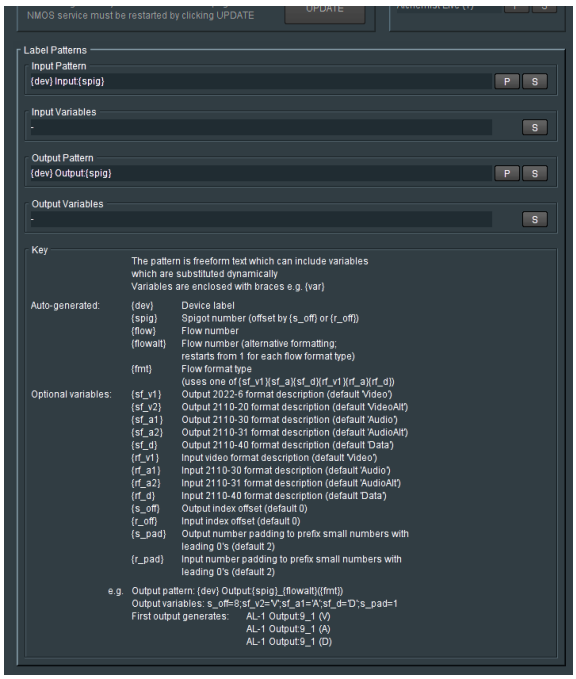
9.17.2 Label Patterns



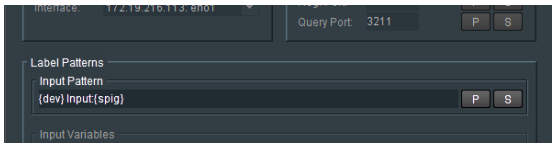
A unique **Label** can be assigned to ease identification in the NMOS Register.

This feature is particularly useful when the Alchemist Live is configured as a three channel system, enabling individual agents to be easily identified in the NMOS Register. Or, if multiple Alchemist Lives are present and require easy identification.

9.17.3 Label Patterns



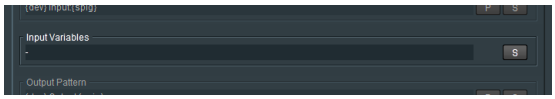
Input Pattern



This allows the User to define how the Input Connector will appear in the NMOS Registry.

The parameters should be entered in terms defined by the **Key**.

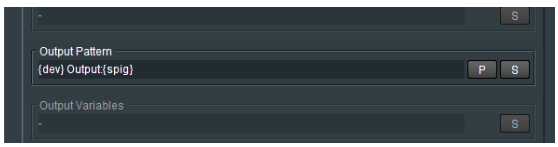
Input Variables



Allows optional variables to be configured, so adding more detail to the NMOS Register.

The parameters should be entered in terms defined by the **Optional Variables** in the **Key**.

Output Pattern



Allows the User to define how the Output Connector will appear in the NMOS Registry.

The parameters should be entered in terms defined by the **Key**.

Output Variables

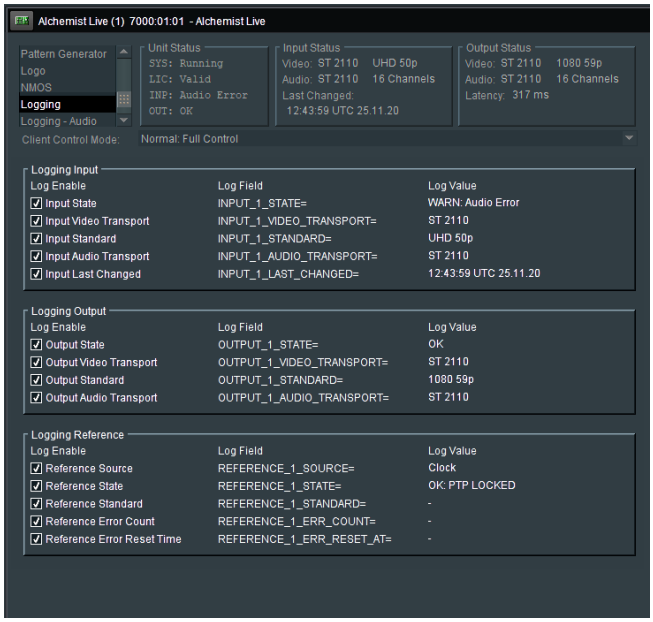
Allows optional variables to be configured, so adding more detail to the NMOS Register.

The parameters should be entered in terms defined by the **Optional Variables** in the **Key**.

Key

The **Key** lists the terms that can be used to define the Alchemist Live, in the NMOS Register.

9.18 Alchemist Live Logging



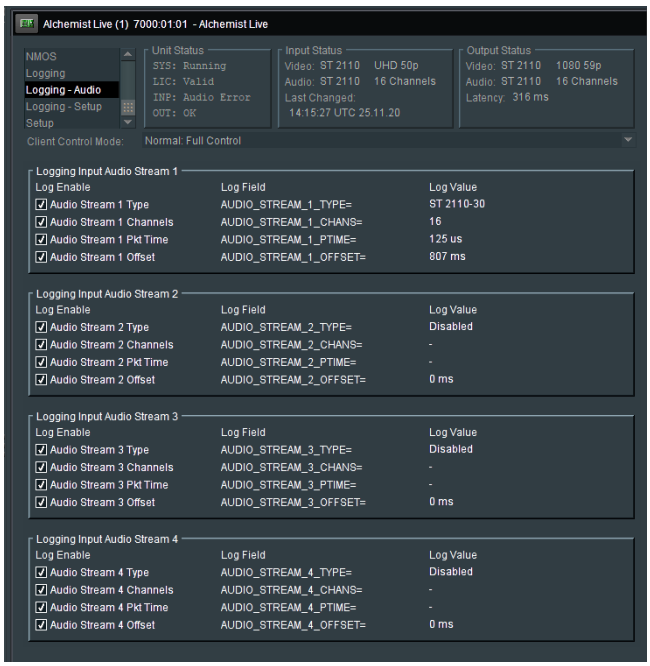
Here items relevant to: Input, Output, can be configured to be logged.

Although **Reference Logging** appears, because Alchemist IP cannot actually be referenced externally, these logging fields will always remain blank.

In the **Logging** menu, log fields may be *enabled*, or *disabled*. Log fields are sent to the defined Log Server (see section 8.7.5 above).

The default configuration is; everything *enabled*.

9.19 Logging – Audio

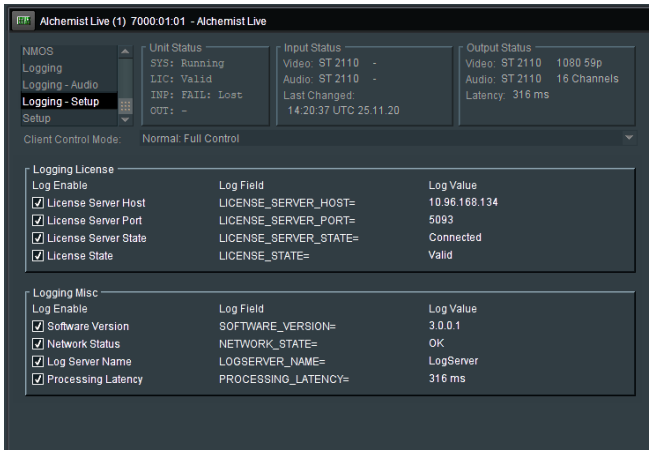


Here, items relevant to Audio can be configured to be logged.

In the **Logging** menu, log fields may be *enabled*, or *disabled*. Log fields are sent to the defined Log Server (see section 8.7.5 above).

The default configuration is; everything *enabled*.

9.20 Logging - Setup



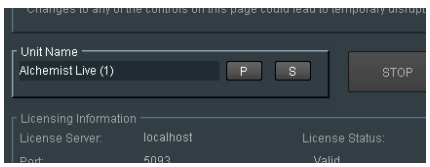
Here items relevant to: **Licensing** and **Miscellaneous** items can be configured to be logged.

In the **Logging - Setup** menu, log fields may be *enabled* and *disabled*. Log fields are sent to the defined Log Server (see section 8.7.5 above).

The default configuration is; everything *enabled*.

9.21 Setup

9.21.1 Unit Name



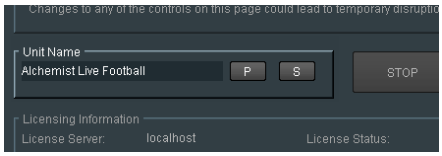
An Alchemist Live running in UHD/4K mode will only have a single Alchemist Live channel. The default name will be:

- **Alchemist Live (1)**

An Alchemist Live running in 3x 1080p (3G) mode will set the default names as:

- **Alchemist Live (1)**
- **Alchemist Live (2)**
- **Alchemist Live (3)**

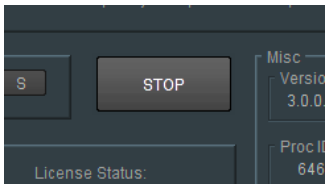
In all cases, the **Unit Name** may be edited:



Once the new name has been typed in, pressing the **S** button will save the change.

Pressing **P** will reset the Unit Name to the default setting.

9.21.2 Agent STOP

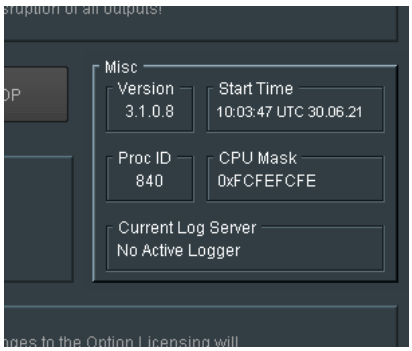


Pressing the **STOP** button will stop the Alchemist Live Agent.

If the Agent is stopped, the template will close.

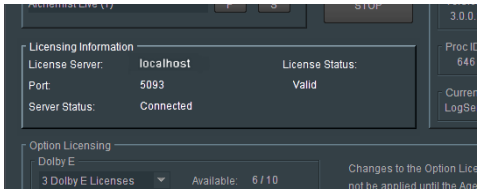
The Agent can be restarted from the **GV Live** template (see part 8.1.2 above).

9.21.3 Misc: Version / Start Time / Proc ID / CPU Mask / Current Log Server



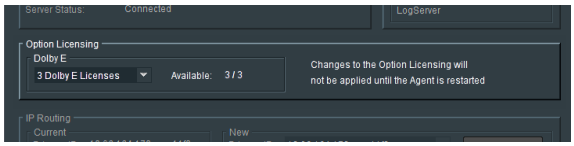
The **Misc** menu offers a number of useful information fields.

9.21.4 Licensing Information



In the **License Information** pane, details of the license server are reported.

9.21.5 Option Licensing

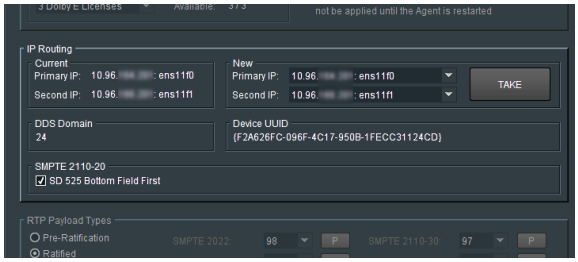


Currently the only optional license applicable to Alchemist Live is for the Dolby E Transcode feature.

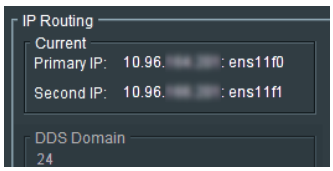
Alchemist Live can be licensed to have just a single Dolby E License, 2x Dolby E licenses, or 3x Dolby E Licenses.

The actual number of Dolby E license available will be reported here.

9.21.6 IP Routing



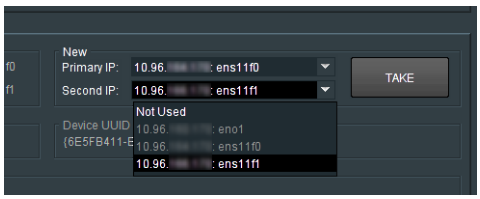
Current



The **Current** pane details the current IP addresses of the Mellanox network adaptors and describes which the Primary is and which the Secondary is.

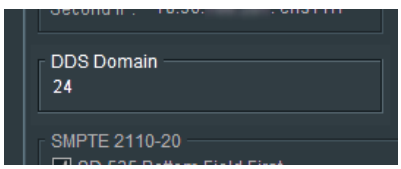
Note – the Mellanox interface has two network ports. The Primary and the Secondary. The function of the Secondary port is to act as a redundant interface, should something adverse happen to the Primary. It is not a mandatory requirement that the Secondary port is configured.

In normal circumstances Network Port **ens11f0** is defined as the Primary and **ens11f1** as the Secondary. However, the designation of Primary and Secondary can be modified using the dropdown menu.



The change will take effect upon pressing the **TAKE** button.

DDS Domain



Here the **DDS Domain** is confirmed.

In this example the **DDS Domain** has been confirmed to be: **101**

Note: The **DDS Domain** is configured at Host level (see section 8.7.3 above).

Device UUID

Reports the UUID (Universal Unique Identifier) of the host machine.

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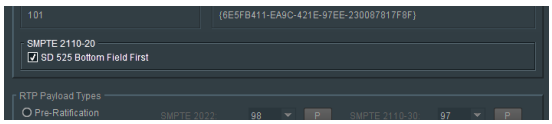
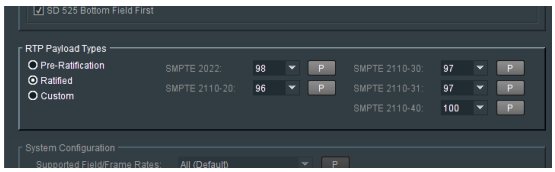


When the defined output standard is 525/59i, this control enables the output to be BFF (Bottom Field First).

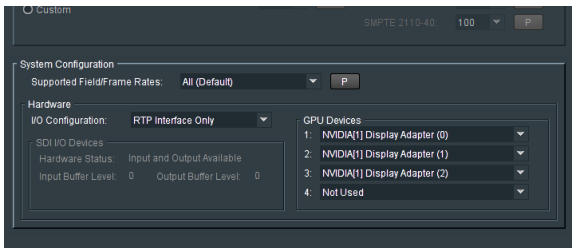
9.21.7 RTP Payload Types



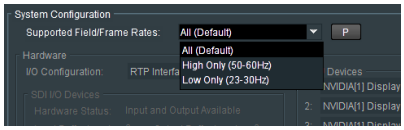
The RTP Payload Type is a 7 bit code in the RTP Packet Header. It indicates the format of the payload and determines its interpretation by the application.

- Pre-Ratification – RTP payload type IDs used by some GV equipment prior to SMPTE ratification.
- Ratified – RTP payload type IDs agreed and ratified by SMPTE.
- Custom – Fully customizable RTP payload type IDs for specific user applications.

9.21.8 System Configuration

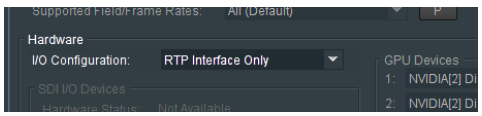


Supported Field/Frame Rates



The **Supported Field/Frame Rates** control allows the Alchemist Live to be configured to allow either only high frame rate conversion, or only low frame rate conversion.

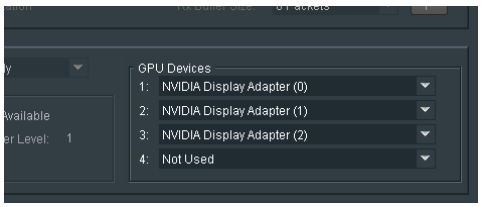
I/O Configuration



The initial version of Alchemist Live IP will only support Video over IP. There is not the option of configuring the system to be either an IP version, or SDI version. Hence the I/O configuration control has no effect.

In a future release, it is anticipated that Alchemist Live will support both Video over IP and SDI.

GPU Devices



The **GPU Devices** field confirms the GPU resource available for video processing.

This field is non-interactive.

Alchemist Live requires 3 GPU, hence 3 GPU are reported and the forth slot is vacant.

Table 2: Supported Resolution/Framerate

Supported Resolution	Framerate
525i (720x480)	29.97psf, 59.94i
625i (720x576)	25psf, 50i
720 (1280x720)	50p, 59.94p, 60p.
1080 (1920x1080)	23.98p, 24p, 25psf, 25p, 29.97psf, 29p, 30psf, 30p, 50i, 50p, 59.94i, 59.94p, 60i, 60p
UHD (3840x2160)	23.98p, 24p, 25p, 29.97p, 30p, 50p, 59.94p, 60p
4K (4096x2160)	23.98p, 24p, 25p, 29.97p, 30p, 50p, 59.94p, 60p

Notes:

1. The supported Resolutions/Frame Rates apply to both Alchemist Live input and output.
2. *High* to *Low* frame rate conversion is not supported (i.e 50p to 23p).
3. *Low* to *High* frame rate conversion is not supported (i.e 29.97p to 50p).

10. The Console

10.1 Introduction

Alchemist Live includes a Console application offering easy configuration of key elements of the system.

Some of the Console features require the use of a USB stick. USB sticks will be automatically mounted and should be formatted as FAT32.

Warning – the Console should not be interacted with when Alchemist Live is processing video as part of a live broadcast, as this can cause minor disturbances on the output pictures.

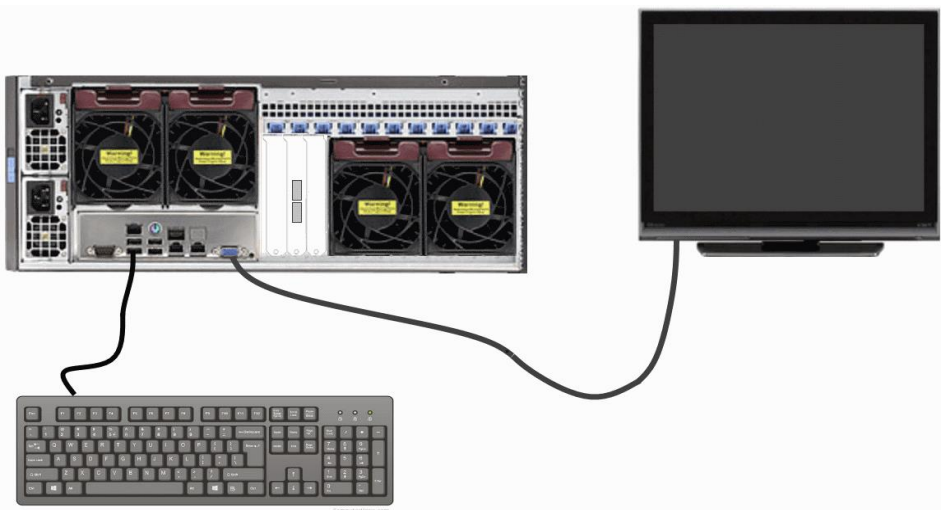
Using the Console, the following items are easily configured:

- Network – NIC 1 (eno1) static IP only, NIC 2, 3 and 4 may be configured to be either Static IP or DHCP.
- The *time* and *date* may be set.
- An upgrade process may be initiated.
- A new license may be installed.
- The status of the system may be displayed.
- Operational Logs may be retrieved.
- The Server can be re-started.
- The Server can be shut down.

10.2 Accessing the Console

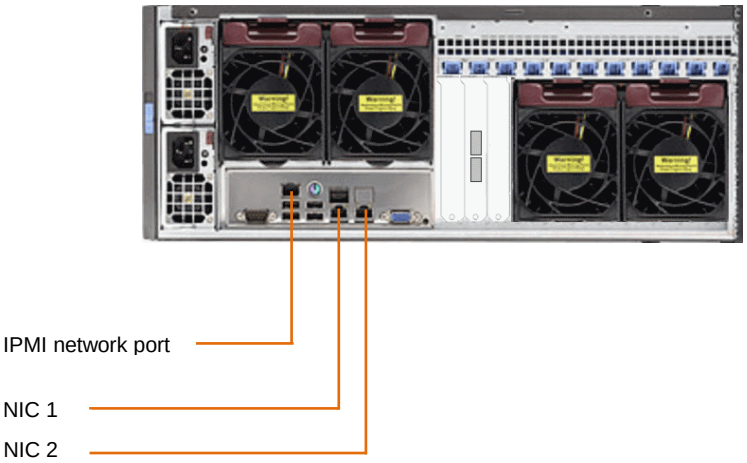
To access the Console connect a monitor to the on-board VGA and connect a USB mouse and keyboard.

1. Connect a Monitor and Keyboard to the Alchemist Live Host machine:



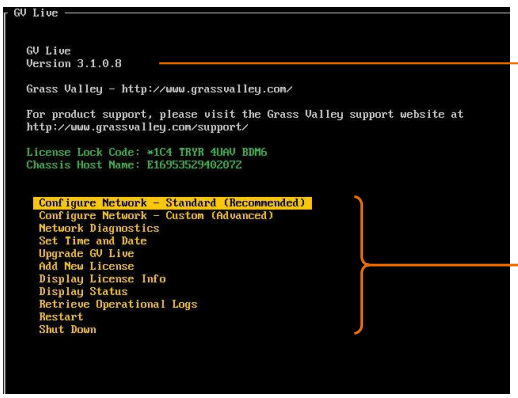
2. Connect a Network cable to the Server:

   Note that there are 3 network ports.



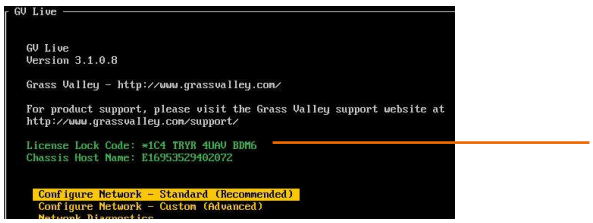
- NIC 1 (eno1) is factory configured with the default Static IP Address: 192.168.0.1. This port maybe set to another static IP address but cannot be set to DHCP.
- NIC 2 (eno2) is factory configured as DHCP. This port may also be configured as Static.
- IPMI port allows control of the IPMI interface (see section 11, below).

3. Boot up the Alchemist Live. Once the boot sequence has completed, the Console will appear automatically:



10.2.1 Retrieval of the License Lock Code:

The License Lock Code is reported in the Console:

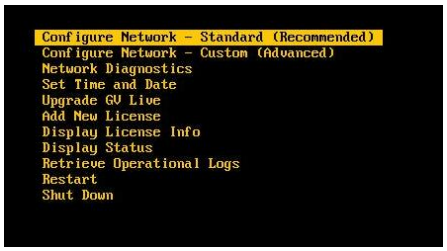


License Lock Code

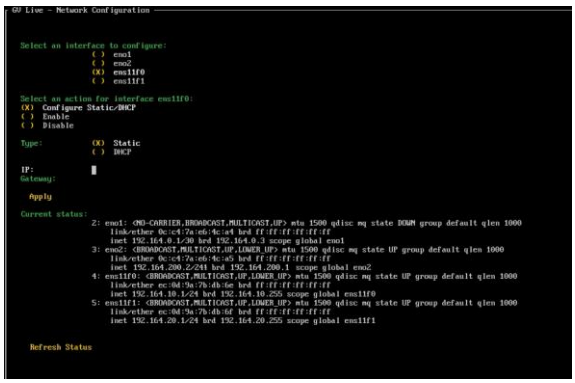
10.2.2 Configure Network – Standard (Recommended)

Using the up/down arrows on the keyboard, highlight the item to be configured.

In this case: **Configure Network**



Press return and the Network Configuration menu will now be displayed:

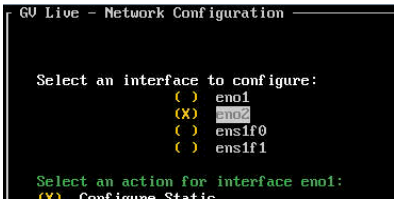


Note that in the Console:

- **NIC 1** equates to **eno1***
- **NIC 2** equates to **eno2**
- **NIC 3 equates to ens1f0 ConnectX-5 - Port 1**
- **NIC 4 equates to ens1f1 ConnectX-5 - Port 2**

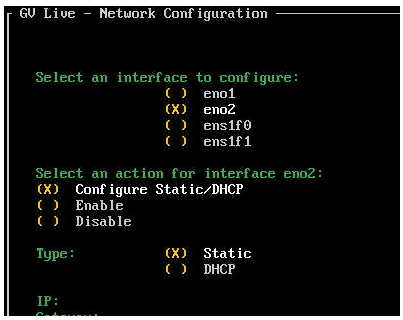
***** This port maybe set to another static IP address, mask and gateway but *cannot* be set to DHCP.

Using the up/down arrows on the keyboard, highlight the NIC to be configured. In this example NIC 2 is selected:



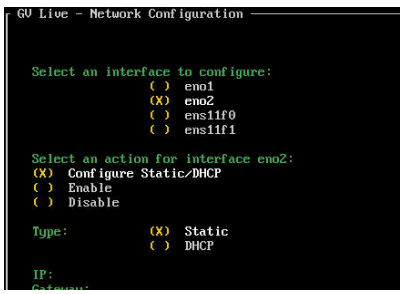
Now press the *space bar* on the keyboard to select the NIC.

Using the up/down arrows on the keyboard, move down to the **Configure** section**.** Note that the menu options will update to:



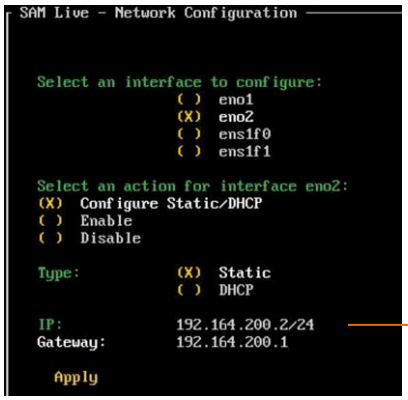
Select the desired configuration.

If the selection is **Static,** press the **Tab** button again and the display will update again, this time with fields to enter an **IP Address** and **Gateway** visible:



Using the up/down arrows on the keyboard, highlight **IP** (IP will turn white):

Type in the required address:



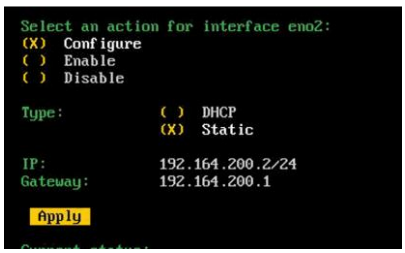
Note:

To specify the Subnet Mask, the IP Address must be appended with: /xx

For example: **192.164.200.2/24** with a Gateway **192.164.200.1**

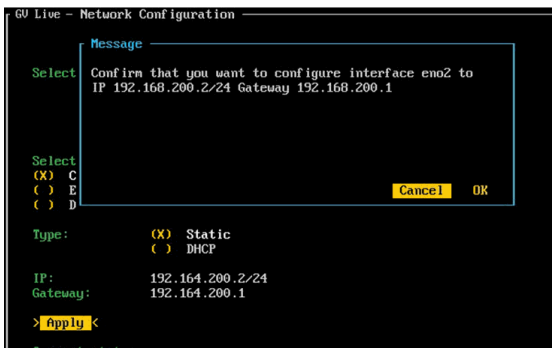
where **/24 = 255.255.255.0** subnet mask.

If it is desired to communicate over an associated/trunked/bridged network, then a Gateway Address will be required:



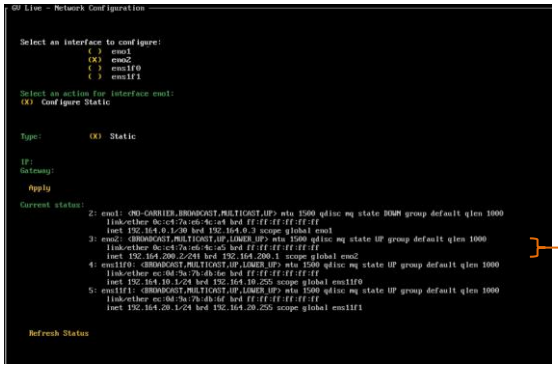
Once **IP Address** and **Gateway** have been configured, using the up/down arrows on the keyboard, navigate to and highlight: **Apply**

Press return and a confirmation of the configuration change will be asked for:



Select **OK**.

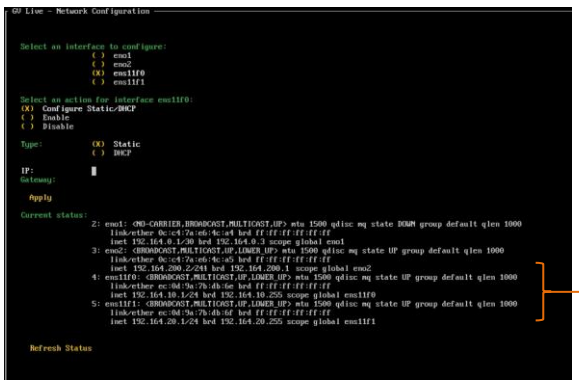
Note that confirmation of the new Static IP Address is displayed in the **Current status** section:



NIC 2 now configured

If the NIC has been configured to be DHCP, the IP Address will be displayed in the Current Status section.

Next, configure the static addresses for **NIC3 (ens1f0)** and **NIC4 (ens1f1)**



NIC 3, 4 configured

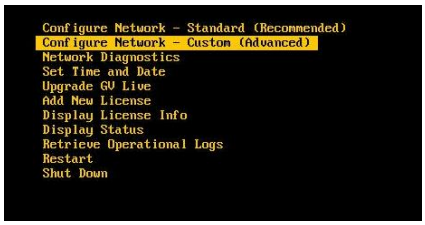
To exit the **Configure Network** menu, navigate down to the **OK** symbol (bottom right corner of display):

Select **OK**. This will return the display to the top menu of the Console.

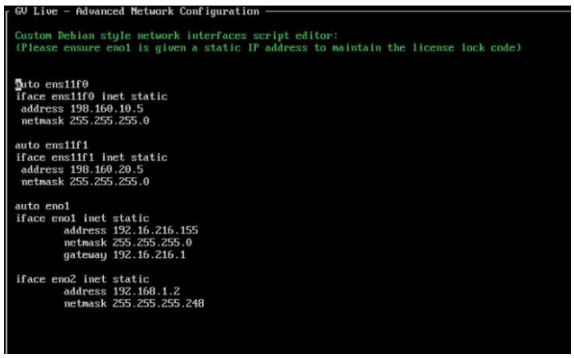
Note: only one gateway address for the various NICs should be defined. One NIC should not be defined to have a different Gateway Address to another NIC. This restriction is a feature of Linux.

If multiple Gateways are required the Advanced Network Config menu can be used to define static routes.

10.2.3 Configure Network – Custom (Advanced)



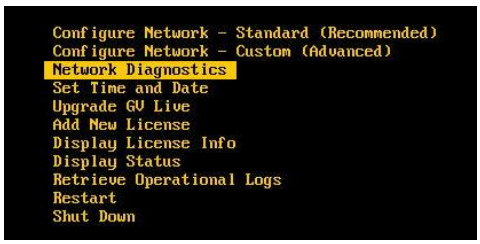
Selecting **Configure Network – Custom (Advanced)** will bring up the **Advanced Network Configuration** menu:

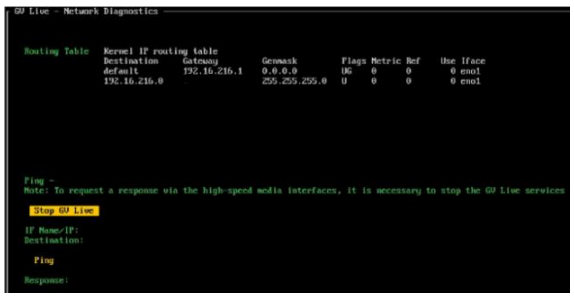


The GV Live Console network configuration now includes an ‘Advanced’ option which is an alternative to the basic approach offered by previous versions of Alchemist Live.

This allows full manual configuration of the unit’s Debian-style network script and allows more sophisticated routing options should it be required. An example would be the creation of static routes.

10.2.4 Network Diagnostics

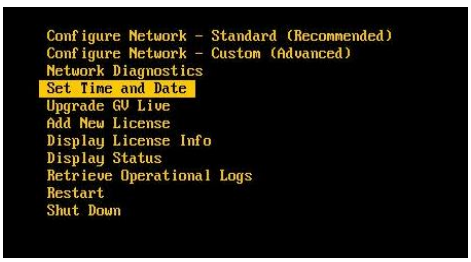




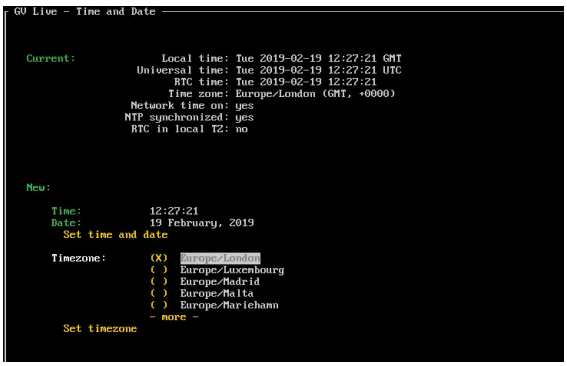
Network Diagnostics includes a Ping feature allowing interrogation of associated networks.

10.2.5 Set Time and Date

Using the up/down arrows on the keyboard, highlight **Set Time and Date:**



Press return to enter the **Set Time and Date** menu:

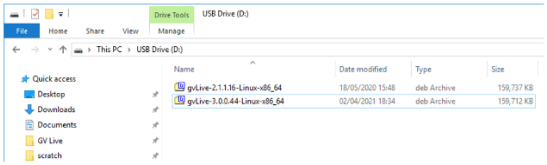


Select OK to complete the process, and return to the top menu.

10.2.6 Upgrade GV Live

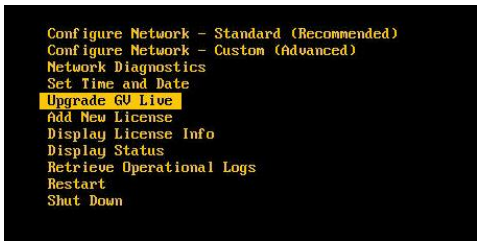
The Software Update will need to be uploaded to a USB Drive.

If the software package is in the form of a Zip file, it should be unzipped prior to being uploaded to the USB drive:

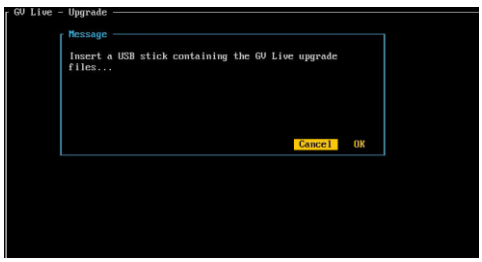


In this example there are two versions of code present on this USB drive.

Using the **up/down** arrows on the keyboard, highlight **Upgrade GV Live**:



Press *return* and a system prompt will appear to insert the USB Drive.



Insert the USB drive.

Note that if there are multiple versions of Alchemist Live software on the USB drive, a menu will appear where by the desired version can be chosen:

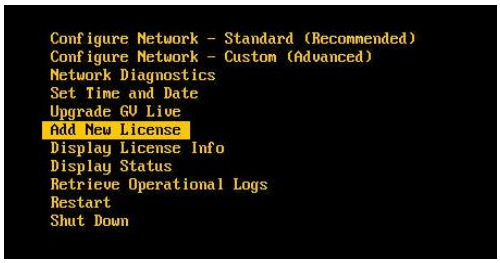
Select **Install** to complete the process.

After install a prompt will appear to re-boot the system.

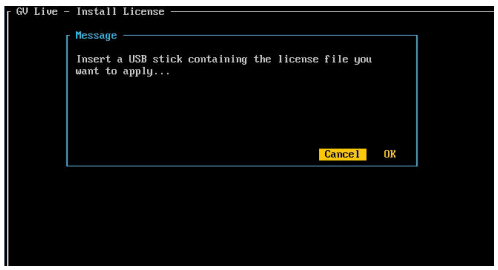
10.2.7 Add New License

The License File will need to be copied onto the root of the USB Drive.

Using the **up/down** arrows on the keyboard, highlight **Add New License:**

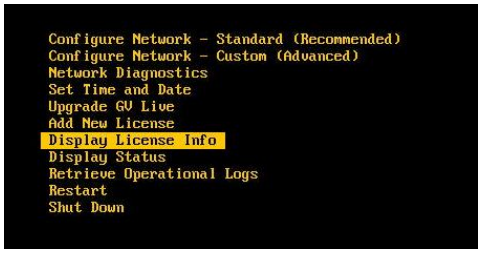


Press *return* and a system prompt will appear to insert the USB Drive.

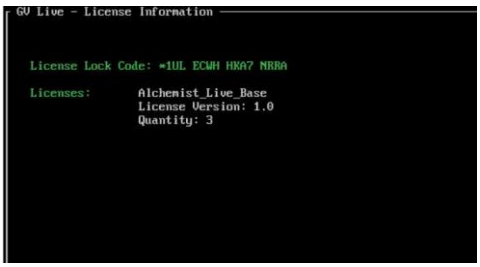


Follow the on-screen instruction to complete the process.

10.2.8 Display License Info

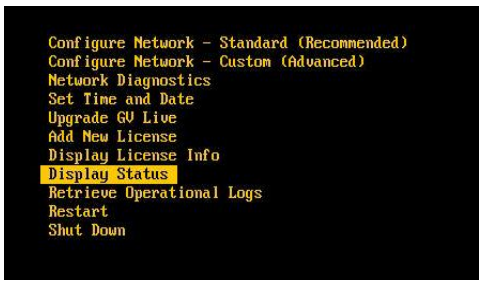


When selected, the details of the installed License will be displayed.

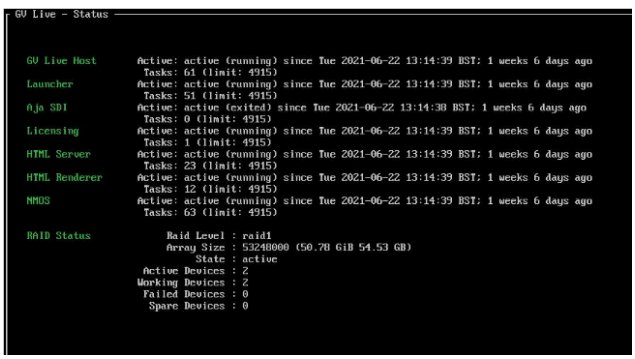


10.2.9 Display Status

Using the **up/down** arrows on the keyboard, highlight: **Display Status**



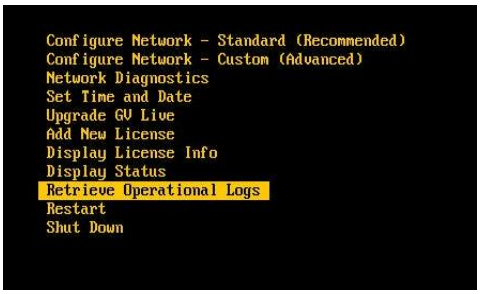
Press ***return*** and the **Status** page will be displayed:



10.2.10 Retrieve Operational Logs

The Operational logs will be downloaded onto a USB Drive.

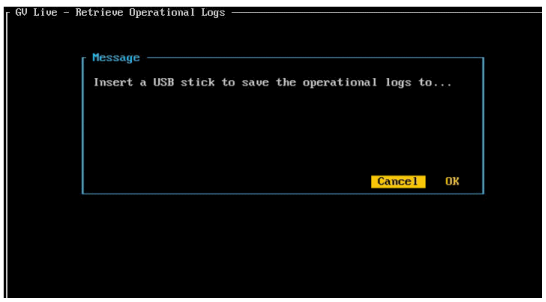
Using the **up/down** arrows on the keyboard, highlight: **Retrieve Operational Logs**



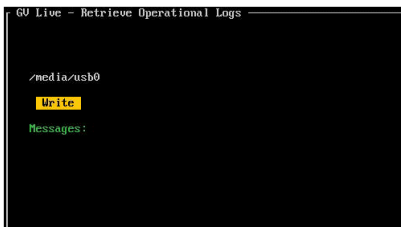
Press *return.*

The logs would usually be written to a USB Drive.

If no USB is present, a message will appear prompting the Operator to insert a USB drive:

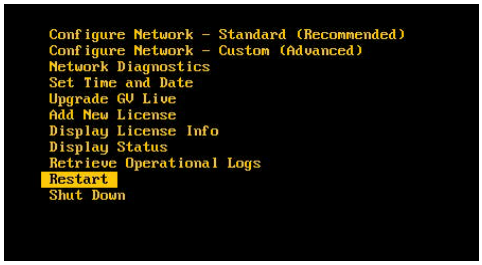


Once a USB Drive is available, the User will be prompted to write the file:



10.2.11 Restart

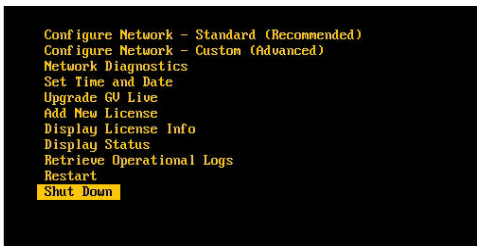
Using the **up/down** arrows on the keyboard, highlight: **Restart**



Press *return* to restart the GV Live Host machine.

10.2.12 Shut Down

Using the **up/down** arrows on the keyboard, highlight: **Shut Down**



Press *return* to power down the GV Live Host machine.

Note: Pressing and holding the chassis power button will also stimulate a system **Shut Down**.

11. IPMI

11.1 Introduction

The **Intelligent Platform Management Interface** (**IPMI**) is a set of computer interface specifications that provides management and monitoring capabilities independently of the host system's CPU, firmware (BIOS or UEFI) and operating system.

Practical uses of this application for Alchemist Live include:

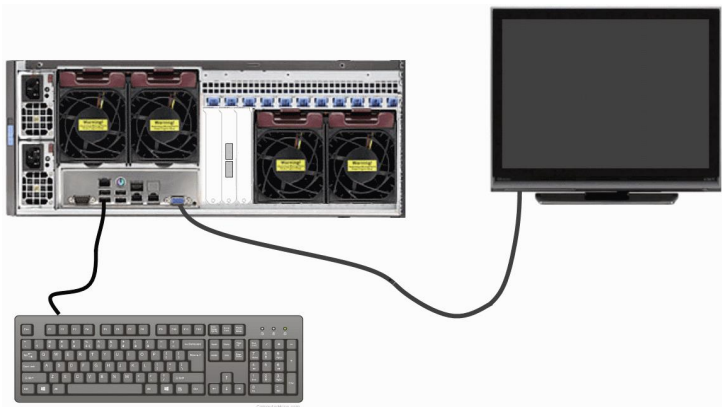
- Remote access to the host machine.
- Remote power cycling.
- Remote access to the BIOS of the host machine.

Warning – the Host Machine should not be interacted with, via the IPMI port, when Alchemist Live is processing video as part of a live broadcast, as this can cause minor disturbances on the output pictures.

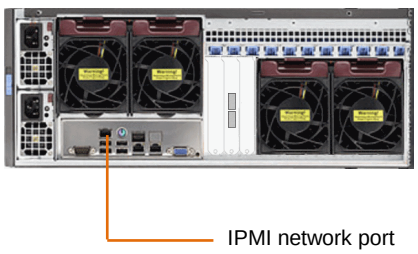
11.2 IPMI IP Address Configuration

The initial configuration of the IPMI network address will require local access to the GV Live host machine.

1. Connect a Monitor and Keyboard to the Alchemist Live Host machine:



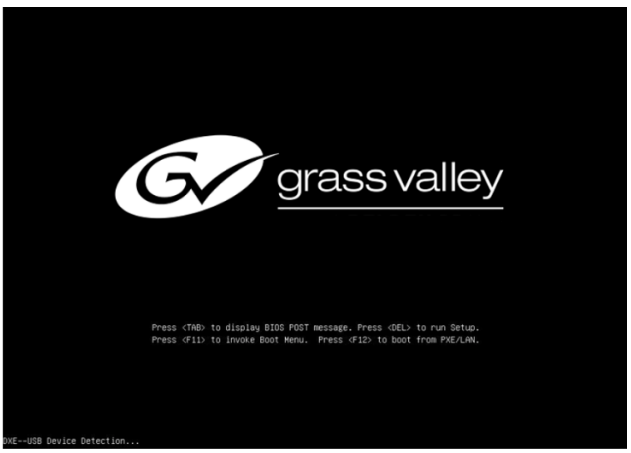
2. Connect the IPMI network port to the LAN.



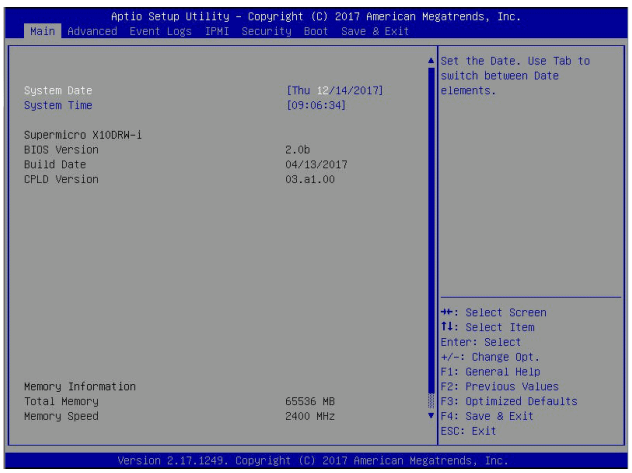
3. Boot up the GV Live host machine.

   Note that the current IPMI IP Address will be displayed on the opening splash screen:

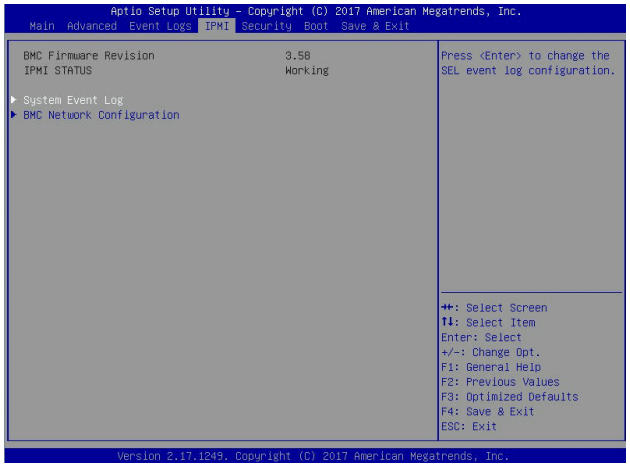
4. Upon seeing the SAM splash screen, press **DEL** to enter the BIOS Menu:



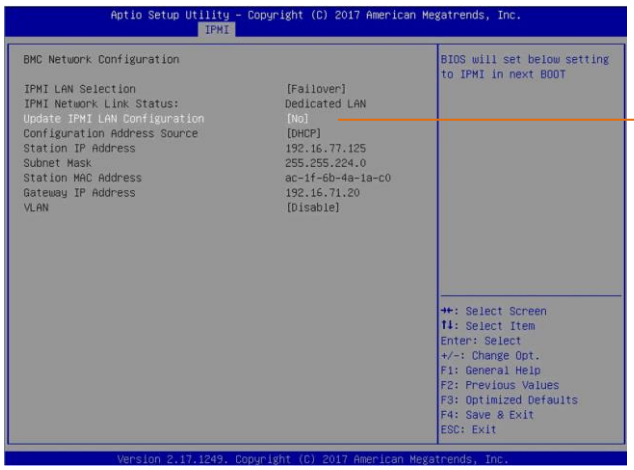
   The BIOS menu will now appear:



5. Navigate to the IPMI menu:



6. Enter the **BMC Network Configuration** submenu.



Update IPMI LAN Configuration

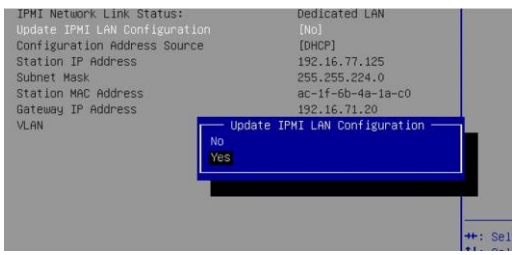
Default setting = [No]

Note that it is possible to lockdown the **BMC Network Configuration** menu, to deter unauthorised configuration.

This is the Factory Default condition of this menu.

If the menu is in lockdown mode, the menu item **Update IPMI LAN Configuration** will be set to **[No],** as shown above.

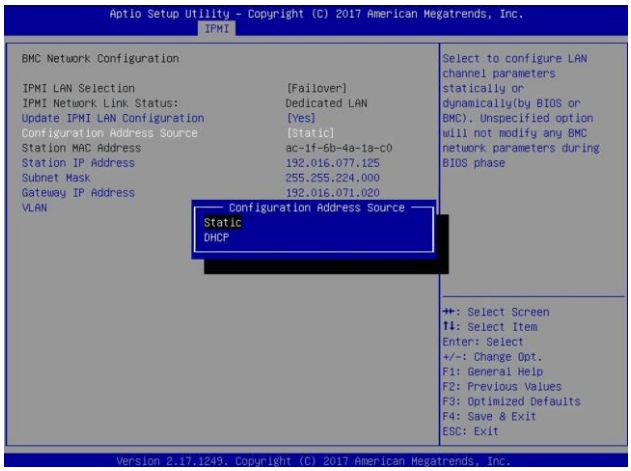
In order to interact with the **BMC Network Configuration** menu, it must be unlocked. This is done by setting **BMC Network Configuration** menu to **[Yes].**



7. The **BMC Network Configuration** menu will now be active.

   In this example the **Configuration Address Source** is set to [**DHCP]**.

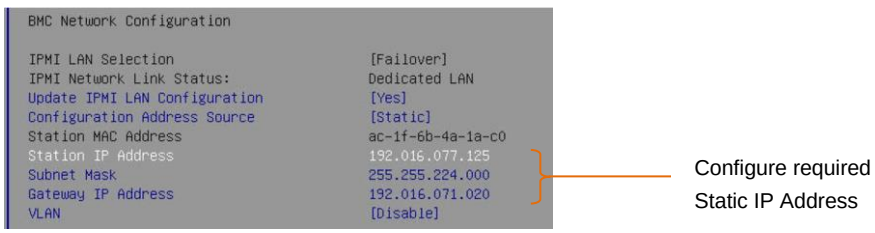
8. If it is desired to configure the address source to be a Static IP Address, select the menu item **Configuration Address Source.** A submenu will appear called **Configuration Address Source:**



   The menu items:

   - Station IP Address
   - Subnet Mask
   - Gateway IP Address

   will all now become active and the desired Static IP Address details maybe configured.



   Save and exit the BIOS menu and the GV Live host machine will continue to boot normally.

11.3 Remote Access via Control Panel Embedded Java Applet

Remote access to the Alchemist Live, via the IPMI port, is possible from a remote PC. This procedure should work on a PC running Windows, Linux or Apple Mac OS.

The following example details remote access from a Windows PC (procedure should also work for Mac, or Linux)

It is a requirement that Java be installed on the remote PC.

BMC Login

Alchemist Live architecture is based on a Supermicro workstation. Supermicro workstations are pre-configure with unique BMC login details. The login details can be found attached to the shipping carton.

Please refer to the Supermicro document: **BMC Unique Password** for more information.

This can be downloaded from the Supermicro website, here:

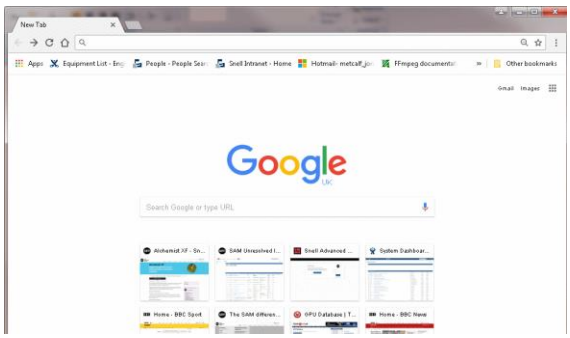
https://www.supermicro.com/support/BMC_Unique_Password_Guide.pdf

1. Open an Internet Browser

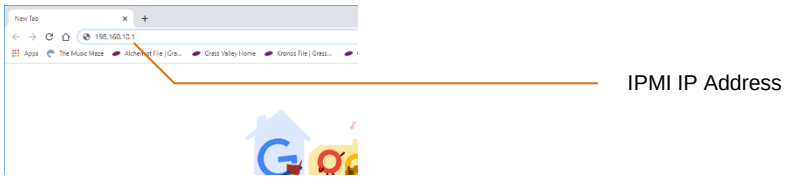
The following have been tested by GV.

- **Windows**: Google Chrome / Mozilla Firefox / Internet Explorer
- **IOS**: Safari

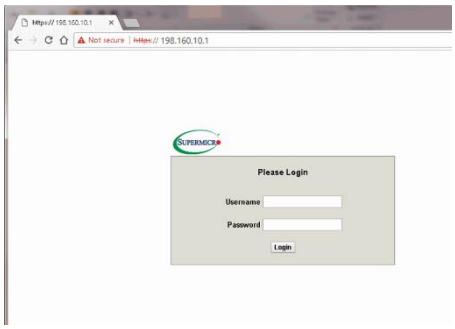
In this example, on a Windows system Google Chrome is the browser of choice:



2. In the Address Bar, enter the IPMI IP Address:

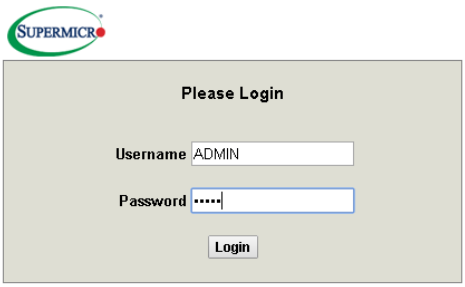


A login page will appear



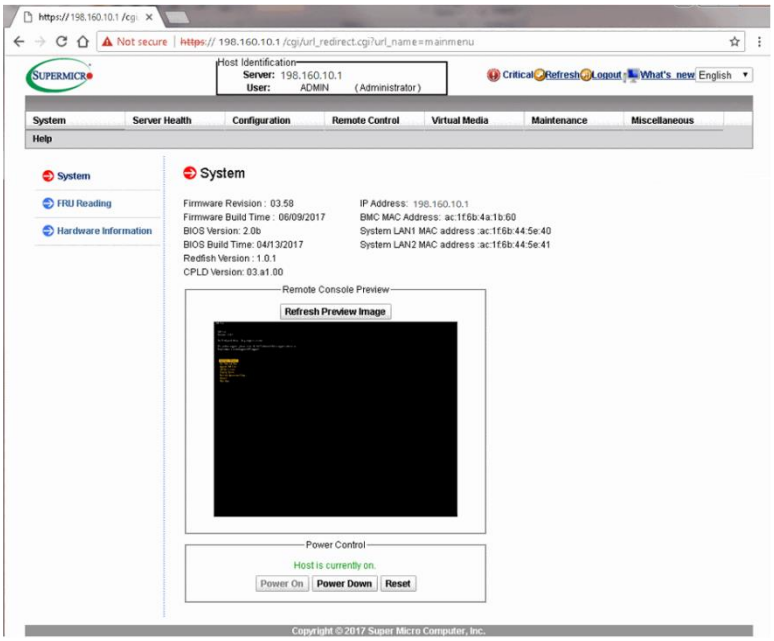
3. Enter the **User Name** and **Password**.

Note: the login details are unique to the Alchemist Live host machine.
These are factory set (see preamble above).



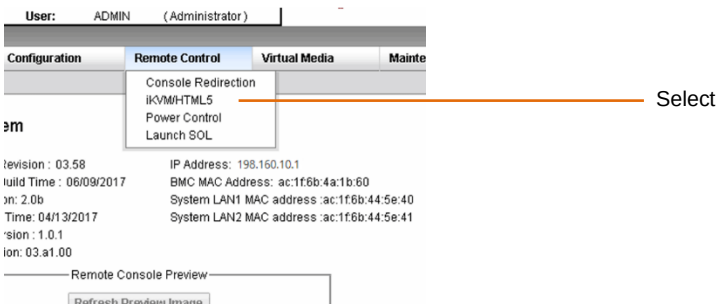
Press *return* to continue.

The SuperMicro System menu will load:

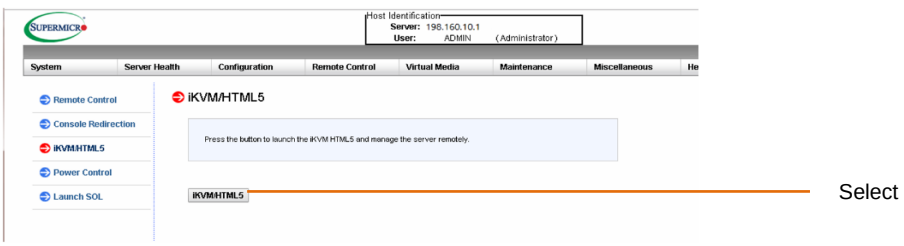


4. In the option bar, hover mouse over **Remote Control.** A drop down menu will appear**.**

   Select **IKVM/HLML5**

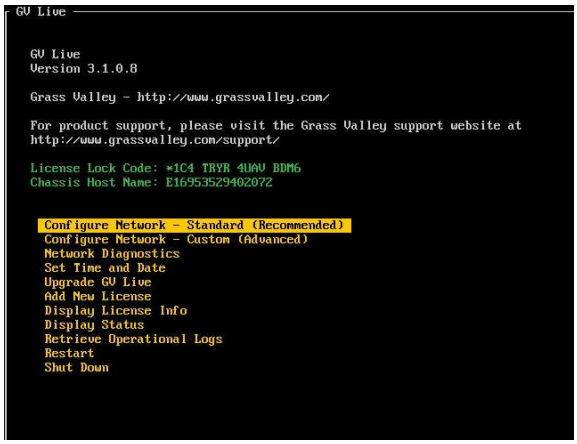


The **IKVM/HTML5** page will appear:



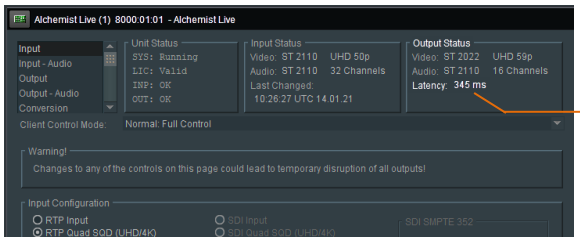
Select **IKVM/HTML5**

The Console should now be displayed



Appendix A. System Latency

The system latency is reported on the **Output Status** pane of the Agent template:



Reported latency

Note that the actual latency will depend on the conversion process being performed. Low frame rate conversion processes typically have a higher latency value, compared to high frame rate processes.

Appendix B. BIOS Settings

The following BIOS settings are configured from the factory and are required to ensure Alchemist Live performs in the intended and optimal manner.

The **BIOS** can be entered by pressing **DEL** on boot.

Advanced > CPU Configuration

- Hyper-threading **Enable**
- AES-NI **Enable**
- Virtualization **Disable**

Advanced > CPU Configuration > Advanced Power Management Configuration

- Power technology **Custom**
- Energy Performance Tuning **Disable**
- Energy Performance BIOS Setting **Performance**
- Energy Efficient Turbo **Disable**

Advanced > CPU Configuration > Advanced Power Management Configuration

- Power technology **Custom**
- Energy Performance Tuning **Disable**
- Energy Performance BIOS Setting **Performance**
- Energy Efficient Turbo **Disable**
- Enter CPU P-States
  - EIST **Enable**
  - Turbo **Enable**
  - P-State Coordination **HW_ALL**
- Enter HWPM State Control
  - HWPM State Control **Disable**
- Enter CPU C-States
  - Package C-State Limit **C0/C1 State**
  - C3 Report **Disable**
  - C6 Report **Disable**
  - Enhanced Halt State **Disable**

- Enter CPU T-States
  - T-State Control **Disable**
  - C3 Report **Disable**

Advanced > Chipset Configuration > North Bridge > Integrated IO Configuration > QPI Configuration

- Link Frequency Select **9.6GT/s**

Advanced > ACPI Settings

- Numa **Enabled**

Appendix C. HTML5 Web Browser

Introduced in V2.0.1.14, the HTML5 web service offers a control surface for Alchemist Live, directly from a web browser installed on a remote workstation.

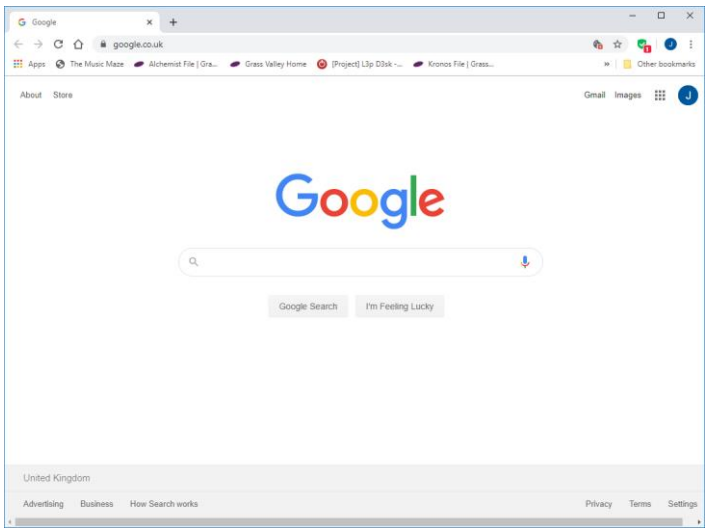
On Linux and Windows platforms, Mozilla Firefox and Chrome web browsers are supported.

On Apple Mac, Safari is supported.

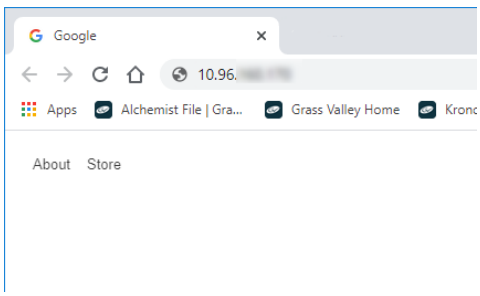
The following procedure describes how to launch the HTML5 web service. In this example Google Chrome is the chosen web browser, but the procedure is the same for all supported web browsers. Note that other web browsers may work, but these are untested by GV.

Procedure:

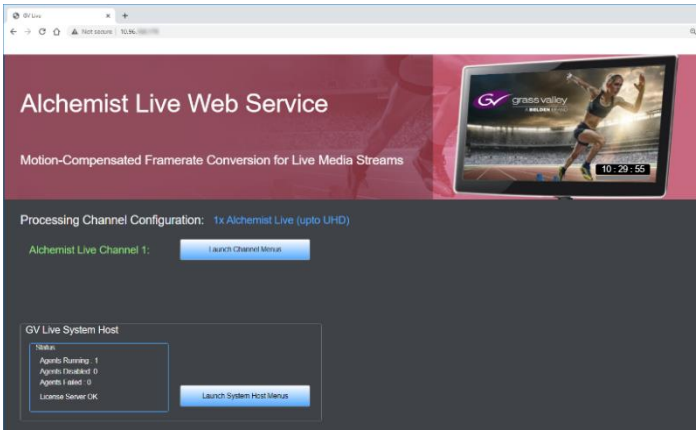
1. On the remote workstation, launch the web browser:



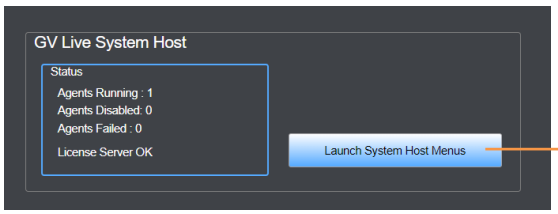
2. Enter the IP Address of the Alchemist Live:



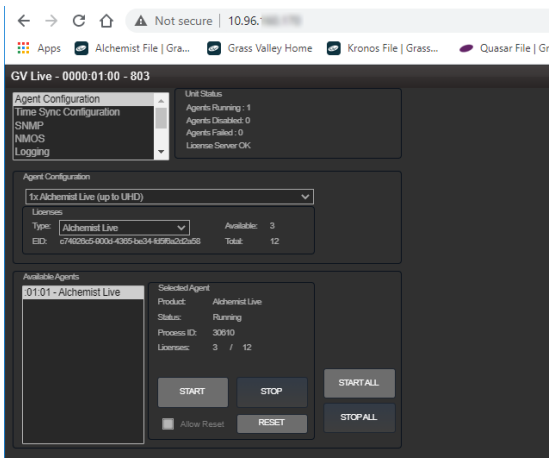
The Alchemist Live HTML5 web service will now load.



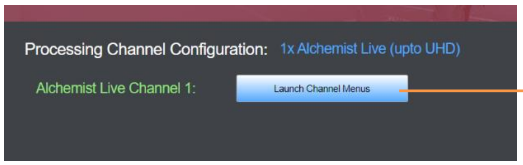
3. Press the **Launch System Host Menus** button.



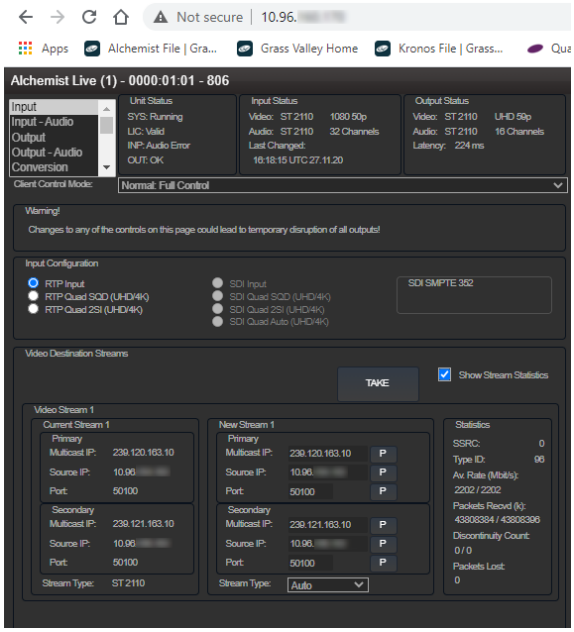
The **Give Live** menu will now load.



4. Press the **Launch Channel Menus** button:



The **Alchemist Live Channel** menu will now load.



The menu structures are the same as RCP.

Appendix D. RGB Legalizer

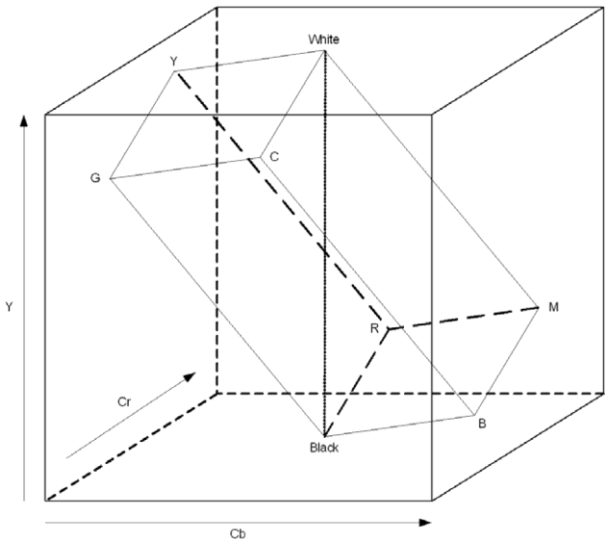
The purpose of the RGB Legalizer is to define limits of YUV peak Luma and Saturation, such that when matrixed to RGB, no illegal colors are generated. Different Broadcasters/Vendors have differing definitions of what constitutes an illegal color, hence several settings are offered, including the Custom mode, making any specific requirements possible.

Alchemist Live incorporates an RGB Legalizer and comprehensive Luma Clipper. The Luma Clipper can be used in combination with the '735mv' legalizer selection to generate images which adhere to EBU R103-200 specification.

RGB Legalizer Overview

Illegal colors are represented by values of RGB that are outside a nominal range (typically 0 to 700mV) when converted to analog values. Illegal RGB colors are easily generated in YCbCr space because of the differences in the valid colorspace between RGB and YCbCr.

RGB occupies a restricted colorspace in the shape of a paralleloid within the YCbCr cube as illustrated in the diagram below.



It can be seen there are many YCrCb values which lie outside the RGB space, and would consequently generate illegal values when converted to analog for display.

Upon detection of illegal RGB colors, there are a variety of techniques to bring them back into legal colorspace. Most legalizers will simply de-saturate the chrominance, leaving the luminance unaltered. The legalizer in the Alchemist Live is more advanced, and is able to preserve the original saturation to a much greater extent by modifying the luminance and chrominance signals simultaneously, giving the best visually subjective results.

RGB Legalizer Controls

- **Off** Disables RGB legalization.
- **700mV** RGB Low 0mV, RGB High 700mV, will comply with area mask set 1% or greater,
- **721mV** RGB Low -21mV, RGB High 721mV, will comply with area mask set 0% or greater.
- **735mV** RGB Low -35mV, RGB High 735mV, will comply with area mask set 0% or greater.

Note: The 735mV selection should be used in conjunction with the Luma clipper (set at presets) to generate images that adhere to: **EBU R103-200** specification.

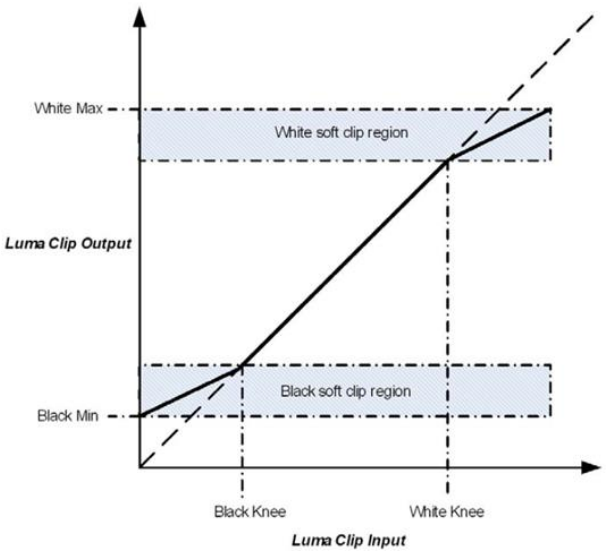
Luma Clipper Overview

When luminance levels are too high or too low, devices such as encoders and displays can have problems. The luminance clipper is used to limit signals above and below predefined limits. Minimum and maximum limits can be set, in addition a knee that allows for a graduated transition to the limit.

Luma Clipper Controls

- **Luma Clipper Enable:** This enables the clipper.
- **White Max** This sets up the upper limit (hard clip point) of the clipper. The range is minimum 90% (852 digital 10-bit value) to maximum 109% (1019) with increments of 1%. Preset is 103% (966).
- **White Knee** This sets up the knee for the maximum white limit of the clipper. This can be set up to give a “soft clip” from this knee point to the hard white clip point. The range is minimum 60% (590) to maximum 109% (1019) with increments of 1%. Preset is 100% (940).
- **Black Min** This sets up the lower limit (hard clip point) of the clipper. The range is minimum -7% (4) to maximum 10% (152) with increments of 1%. Preset is -1% (55).
- **Black Knee** This sets up the knee for the minimum black limit of the clipper. This can be set up to give a “soft clip” from this knee point to the hard black clip point. The range is minimum -7% (4) to maximum 60% (590) with increments of 1%. Preset is 0% (64).

Note: The Luma clip preset values configure the clipper to meet Luma limits as specified by EBU R103-200.



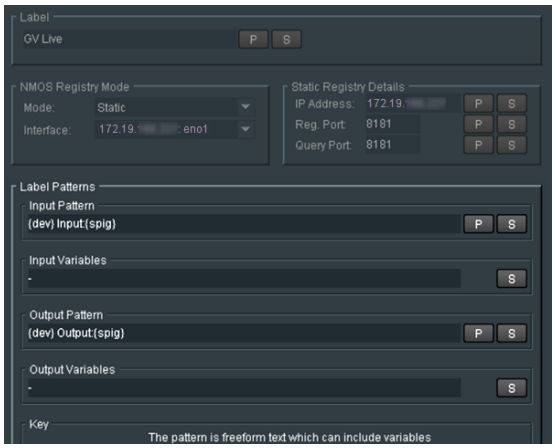
To achieve a hard white clip set the **White Max** and **White Knee** to the same value. Similarly to achieve a hard black clip set the **Black Min** and the **Black Knee** to the same value.

Appendix E. NMOS Example

Default Settings

When the NMOS **Label Pattern** menu is configured with default settings:

i.e.



In a typical NMOS Register, Alchemist Live may appear like this:

HOSTS	AGENTS		
Nodes	Devices	Senders	Receivers
GV Live	Alchemist Live (1)	Alchemist Live (1) Output:05 *Video source 04*	Alchemist Live (1) Input:01 *Video*
		Alchemist Live (1) Output:05 *Audio source 04*	Alchemist Live (1) Input:01 *Audio*
		Alchemist Live (1) Output:05 *Data source 04*	Alchemist Live (1) Input:01 *Audio*
			Alchemist Live (1) Input:01 *Audio*
			Alchemist Live (1) Input:01 *Audio*
			Alchemist Live (1) Input:01 *Data*

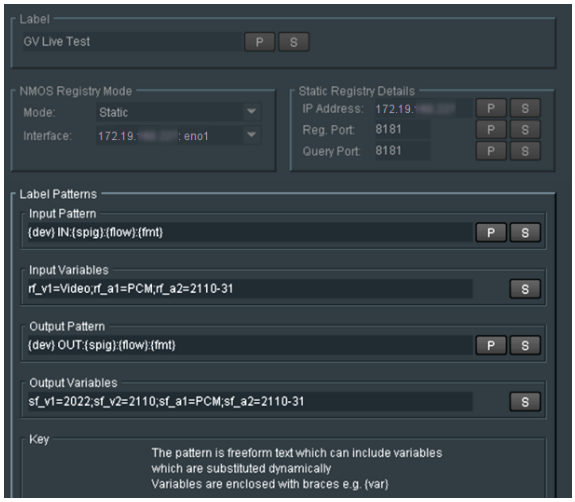
Key:	
	Active
	Not active/Disabled

Note, in this example:

1. Only a single audio stream is applied to the input, hence only the one audio Receiver is active, while the other three are inactive.
2. Data sources are not supported by Alchemist Live, hence appear as **Not Active.**

Custom Label Pattern

Consider the following configuration:



In a typical NMOS Register, Alchemist Live may appear like this:

HOSTS	**AGENTS**		
Nodes	Devices	Senders	Receivers
GV Live Test	Agent1	Agent1 OUT:00:2110 *Video source 04*	Agent1 IN:00:Video *Video*
		Agent1 OUT:01:2110-30 *Audio source 04*	Agent1 IN:01:PCM *Audio*
		Agent1 OUT:05:no flow *Data source 04*	Agent1 IN:02:PCM *Audio*
			Agent1 IN:03:PCM *Audio*
			Agent1 IN:04:PCM *Audio*
			Agent1 IN:05:Data *Data*

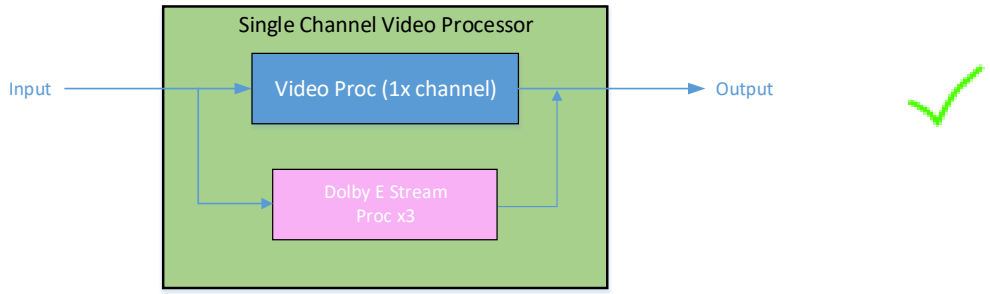
How they actually appear will depend upon the actual NMOS Register used.

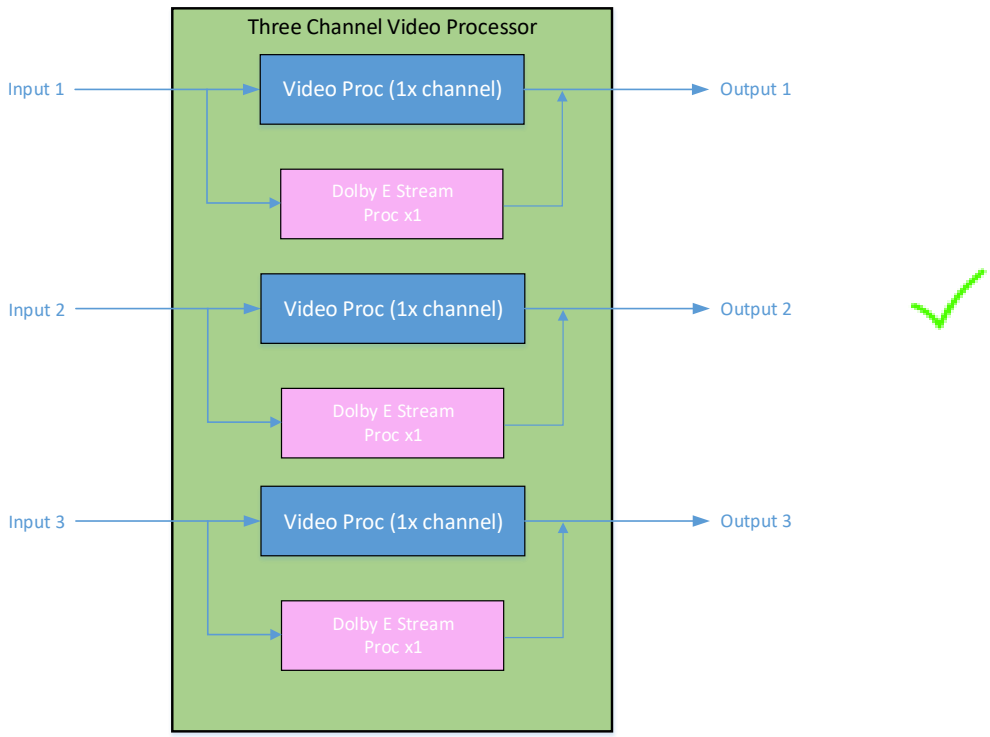
Appendix F. Dolby E Transcode Configuration

Introduced in the IP variant of Alchemist Live in Version 3.0.0.36, Alchemist Live allows transcoding of up to three Dolby E audio streams.

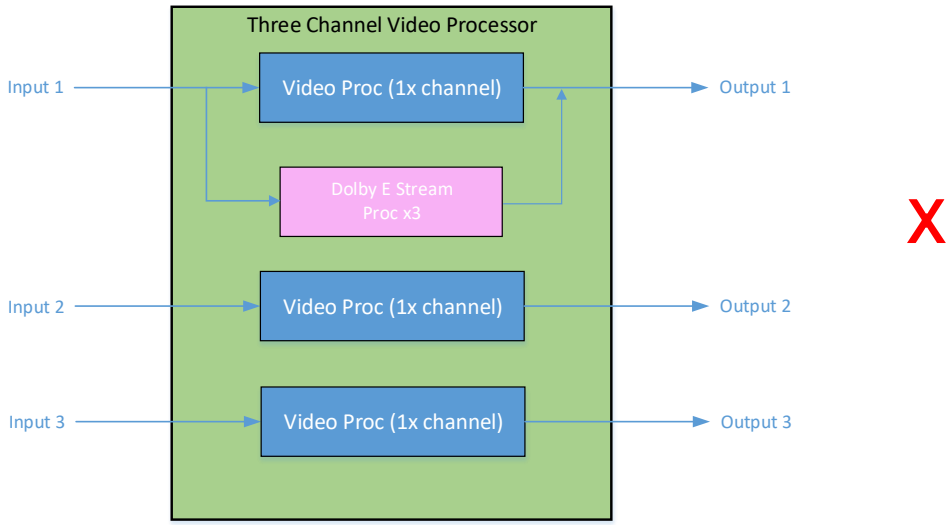
When Alchemist Live is configured as a single channel video processor, up to three Dolby E audio streams can be transcoded.

When Alchemist Live is configured as a three channel video processor, one Dolby E audio stream per video processor channel, can be transcoded:





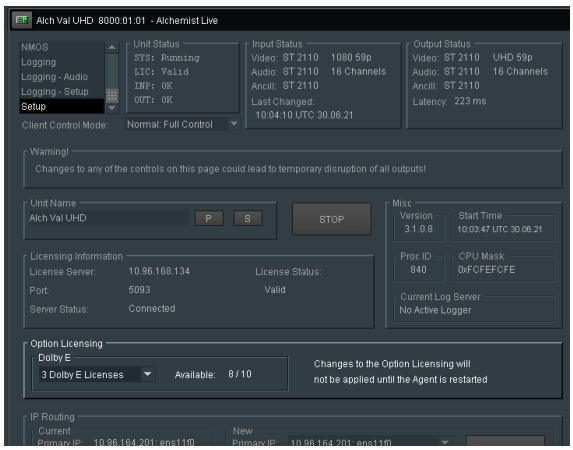
Note that it is not possible, in a 3 channel Alchemist Live configuration, to configure multiple Dolby E channel transcoding, with regard to a single video channel:



Alchemist Live – Dolby Configuration Procedure

1. **Applying the Option Licensing**

   In the Alchemist Live Setup menu, configure the **Option Licensing:**

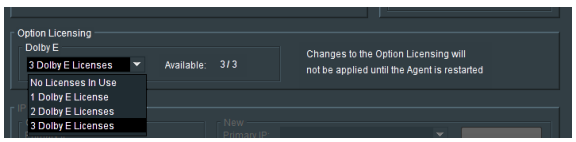


   Note that the number of available licenses will depend upon how many have been purchased.

   A single Alchemist Live can support up to three separate Dolby E transcodes.

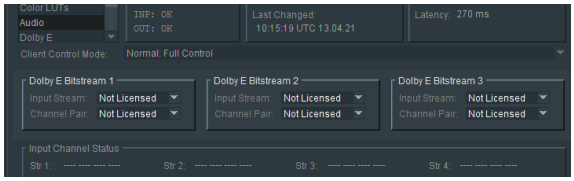
   In the example above, three Dolby E licenses are available, but none have been applied.

   The required license configuration can be selected using the drop down menu:

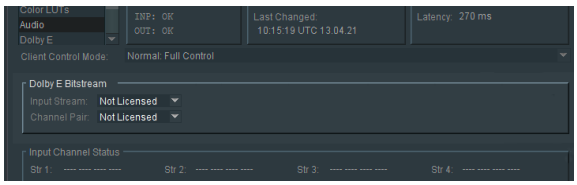


2. In the Alchemist Live Audio menu, it is required to define the incoming audio pairs that contain the incoming Dolby E stream(s).

   When Alchemist Live is configured as a single channel video processor, the menu offers configuration of up to three Dolby E licenses:

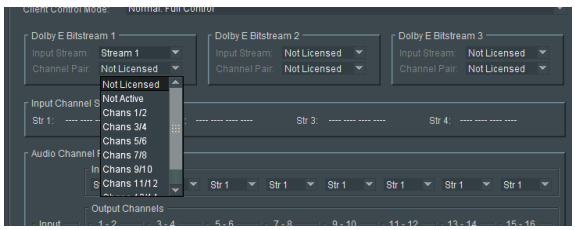


   When Alchemist Live is configured as a 3 channel video processor, the menu offers configuration of a single Dolby E license (one per video channel):

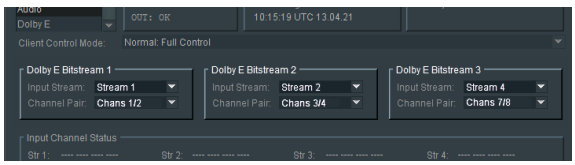


   The default state is **Not Licenced.**

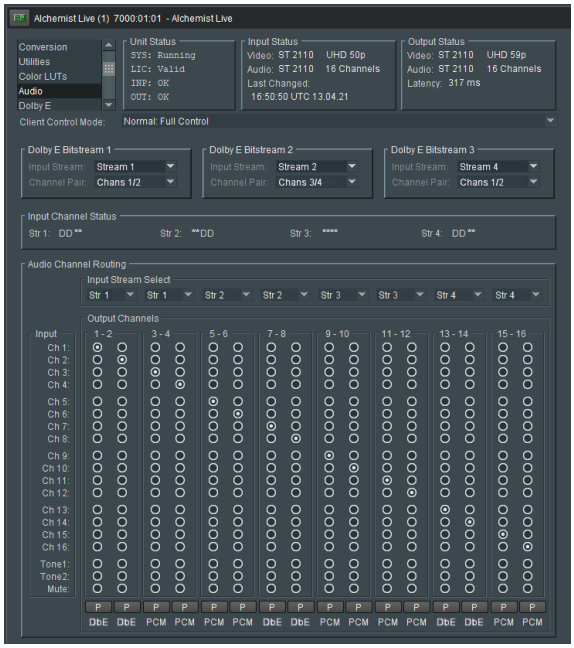
   Licenses may be configured using the drop-down menus:



   The following example shows a single channel Alchemist Live, configured for three incoming Dolby E streams:



Note that the configured **Dolby E Stream Select** menu will be reflected in the **Audio Channel Routing** menu:



Appendix G. Alchemist Live IP Connectivity Table

Connectivity to Alchemist Live IP will depend on many factors, such as:

- The speed of the Ethernet switch Alchemist Live IP is connecting to.
- The network range that the connection is required to work over.
- If redundancy is required.

The table below list the various connections that can be supported.

Table 3: Alchemist IP Connectivity

Alchemist Live IP connecting to:	Ports used	IP Option	Description	1 x UHD	3 x HD	QSFP / SFP required (not included)
100G IP Switch (non-redundant)	1	1 x FCQ-100GE-SR4	100GBASE-SR short range QSFP for MMF	Yes	Yes	QSFP-100G-SR4 (x1)
100G IP Switch (redundant)	Not Available *					
25G IP Switch (non-redundant)	1	1 x FCQ-ADPT-SR	Ethernet adapter 100 Gb/s to 25 Gb/s QSFP28 to SFP+	Yes	Yes	SFP-25G-SR (x1)
25G IP Switch (redundant)	2	2 x FCQ-ADPT-SR	Ethernet adapter 100 Gb/s to 25 Gb/s QSFP28 to SFP+	Yes	Yes	SFP-25G-SR (x2)
40G IP Switch (non-redundant)	1	1 x FCQ-40GE-SR	40GBASE-SR short range QSFP for MMF	Yes	Yes	QSFP-40G-SR4 (x1)
40G IP Switch (redundant)	2	2 x FCQ-40GE-SR	40GBASE-SR short range QSFP for MMF	Yes	Yes	QSFP-40G-SR4 (x2)
10G IP Switch (non-redundant)	1	1 x ADPT-10	Ethernet adapter 40 Gb/s to 10 Gb/s QSFP to SFP+	No	Yes	SFP-10G-SR (x1)
10G IP Switch (redundant)	2	2 x ADPT-10	Ethernet adapter 40 Gb/s to 10 Gb/s QSFP to SFP+	No	Yes	SFP-10G-SR (x2)

* 100G connectivity with redundancy is not possible to support because the resultant 200G total bandwidth required will exceed the maximum bandwidth of the PCIe bus.