



## **7815VPDA Series Video Processor and Distribution Amplifier User Manual**

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Version 1.6, December 2018

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## IMPORTANT SAFETY INSTRUCTIONS

	<p>The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.</p>
	<p>The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.</p>

- Read these instructions
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

### **WARNING**

TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE

### **WARNING**

DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT

### **WARNING**

TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE

### **WARNING**

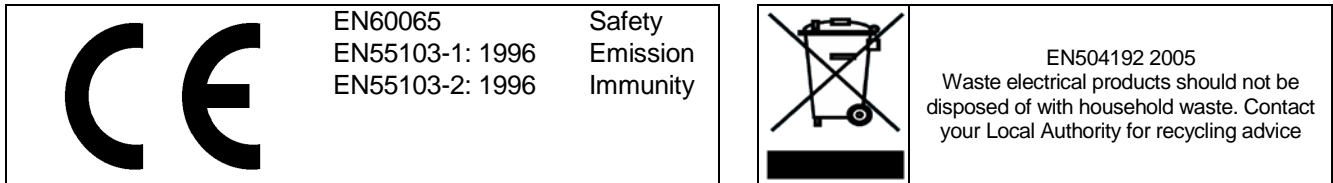
THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

## INFORMATION TO USERS IN EUROPE

### NOTE

#### CISPR 22 CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



## INFORMATION TO USERS IN THE U.S.A.

### NOTE

#### FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### WARNING

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

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## REVISION HISTORY

<u>REVISION</u>	<u>DESCRIPTION</u>	<u>DATE</u>
1.0	First Release	Sep 2013
1.1	Updated Section 7.14 and 7.32	Oct 2014
1.2	Added Section 7.36 and 7.37	Nov 2014
1.3	Updates throughout	Jan 2015
1.4	Updated AVM and Video Encoder Control Sets (3.13 build 412)	Jun 2015
1.5	Updated Manual for latest firmware feature set (4.16 build 466)	Dec 2015
1.6	Added SCTE104 Option	Dec 2018

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## 1. OVERVIEW

The 7815VPDA-3G-F-2 and 7815VPDA-HD-F-2 are dual path broadcast quality Video Processors and Distribution Amplifiers that support SD, HD and 3G (*[-3G] option*) video formats. The 7815VPDA series supports one coax and one fiber optic input on a per path basis. Using a software selection process, the fiber optic or coax input signal may be utilized for subsequent module processing that feeds the program outputs (PGM OUT). Fiber inputs/outputs are supported via pluggable Evertz SFP modules (Rx: SFP3R-2, Tx: SFP3T13-2). Coax inputs are supported via HD-BNCs or DINs (*[+DIN] Rear-plate ordering option*). Two re-clocked DA outputs of either the Fiber or Coax input signal are present on HD-BNC/DIN outputs for connection to external elements like patch panels. Four fully processed fiber outputs and six fully processed coax outputs are presented on a per path basis.

The core processing features of the 7815VPDA include Source Identification (Source ID) tag insertion, frame synchronization to external reference with H/V phase adjustment, feature rich video adjustment (colour correction, hue/gain/video level adjustments), image enhancement, audio channel shuffling, audio and video delay adjustments, 5.1 audio downmix processing and advanced audio & video monitoring. See Figure 1-1 for a detailed system block diagram illustrating signal flow and processing from input to output.

The 7815VPDA series also supports substantial additional video processing features with the *[+UDX2]* and *[+SLKE2]* product options. The *[+UDX2]* product option adds up/down/cross video conversion capabilities including all necessary translation to closed caption (CEA608, CEA708), teletext (OP42,OP47) and time code data (SMPTE 12M). The *[+UDX2]* product option also provides noise reduction, motion adaptive deinterlacing, and a high-quality, fully user configurable scaler. The *[+SLKE2]* product option adds a fully configurable IP streamed H.264 or MPEG-2 video encoding of both video processing paths with stereo (2-ch) audio encoding (MPEG-2 Layer 1/ HE-AAC-V1 / HE-AAC-V2 / AAC-LC). The *[+SLKE2]* product option includes a dedicated 5.1 down-mix processor that can be used to produce 2-ch audio for encoding.

Additional audio processing features available on the 7815VPDA include IntelliGain<sup>®</sup> Audio Loudness Processing *[+IG2]*, and stereo to 5.1 up-mixing *[+UMX2]*. See Figure 1-2 for a system level view of the 7815VPDA audio processing.

Source ID tags inserted by the 7815VPDA include extensive information about the video signal and its transmission history. The 7815VPDA supports processing of up to 16 Source ID tags. Key information elements inserted into each Source ID tag include DATE, TIME, BASE LABEL, ALIAS LABEL and USER CODE information.

The 7815VPDA is a dual slot card. A 7800FR or 7800FR-QT can therefore support 14 paths of processing within a 3RU form factor. The 7815VPDA shares a common rear panel with both the 7815IDA and the 7847FSEDA series. This allows 7815VPDA modules to be interchanged with 7815IDA or 7847FSEDA without requiring a change to the backplane interconnect.

These modules are SNMP capable for remote monitoring, control and configuration purposes using VistaLINK<sup>®</sup> PRO. VistaLINK<sup>®</sup> PRO control and monitoring is available when modules are used with a 7800FC in slot 1 of the 7800FR frame.

### Summary of 7815VPDA Series Features:

- Dual path Video Processor and Distribution Amplifier
- 14x paths of processing in 3RU

- Comprehensive video processing DA functionality with 6x processed coax outputs and 4x processed fiber outputs per path
- Re-clocked, non-processed outputs and processed outputs may be independently sourced from the SFP or coaxial inputs (software selectable)
- Mini DIN 1.0/2.3 I/O support with +DIN rear panel option
- Fiber inputs and outputs are available when fiber SFP transmit and/or receive modules are installed
- Coaxial SFP's may also be installed in SFP ports to provide alternate coaxial inputs and/or additional processed coaxial outputs
- Input may be sourced from coaxial or SFP sources, and through software selection may be manually forced to either input or may operate in an automatic mode based on loss of video
- Economical SCTE104 message insertion over IP via the SCTE104 API with +SCTE104-2 option
- Support for 16 channels of embedded audio
- 5.1 to stereo down-mixing (LoRo or LtRt)
- VistaLink Pro and SNMP enabled
- Optional monitoring quality MPEG2/H.264 encoder
- User selectable encode bit rate
- Compatible with PC, STB or dedicated modular decoders
- AAC-LC, HE-AAC-V1/2 encoded audio
- Optional Frame Sync and Up/Down/Cross conversion
- Broadcast quality up/down/cross conversion with de-interlacing
- Video proc, detail enhancement, color space conversions
- Full processing of CEA 608/708 Closed Captions and time code with all required data translations and time code re-calculations

**[+UMX2] Auto Stereo to 5.1 Upmix Processor Features:**

- Auto detection of stereo (2-ch) or surround (5.1 ch) input audio
- Automatically upmixes stereo (2-ch) to surround (5.1 ch)
- Audio input mixer processing (source / gain / invert)

**[+IG2] IntelliGain® 16-channel Loudness Processor Features:**

- Normalize loudness of audio programs to a target level
- Supports up to 16 programs and 16 channels (*per video path*)
- Relatively constant gain within a program interval to preserve audio dynamic range
- Simultaneously process multiple multi-channel programs
- User adjustable attack and release times
- Loudness algorithm based on ITU-R BS.1770-3
- Peak limiting
- LKFS calculations
- Momentary, short term and integrated loudness measurements

**[+UDX2] Advanced Video Processing Up/Down/Cross Conversion with Frame Synchronization Features:**

- Independently configurable for both video paths
- Up/Down/Cross conversion between supported video standards
- Full translation of time code (SMPTE 12M: D-VITC, ANC-LTC, ANC-VITC)
- Full translation of closed caption data (CEA608, CEA708)
- Full translation of teletext (OP42, OP47)
- User configurable ANC data pass through during video standard conversion
- Temporal Noise Reduction (TNR)
- Motion adaptive deinterlacing (MAD)
- Fully user configurable, high quality scaler
- AFD input processing and output AFD authoring
- System time code generation with NTP synchronization

**[+SLKE2] IP Streaming H.264/MPEG-2 Video Encoder Features:**

- Independently configurable for both video paths
- H.264 or MPEG-2 video encoding
- Constant or Variable Bitrate Modes
- User configurable bitrates between 0.5 Mbps to 25 Mbps per path.
- MPEG-2 Layer 1/ HE-AAC-V1 / HE-AAC-V2 / AAC-LC Stereo (2-ch) audio encoding
- Dedicated surround sound (5.1 ch) to stereo (2 ch) audio down-mixer
- Closed caption support
- Supports multicast or unicast destination IP addresses

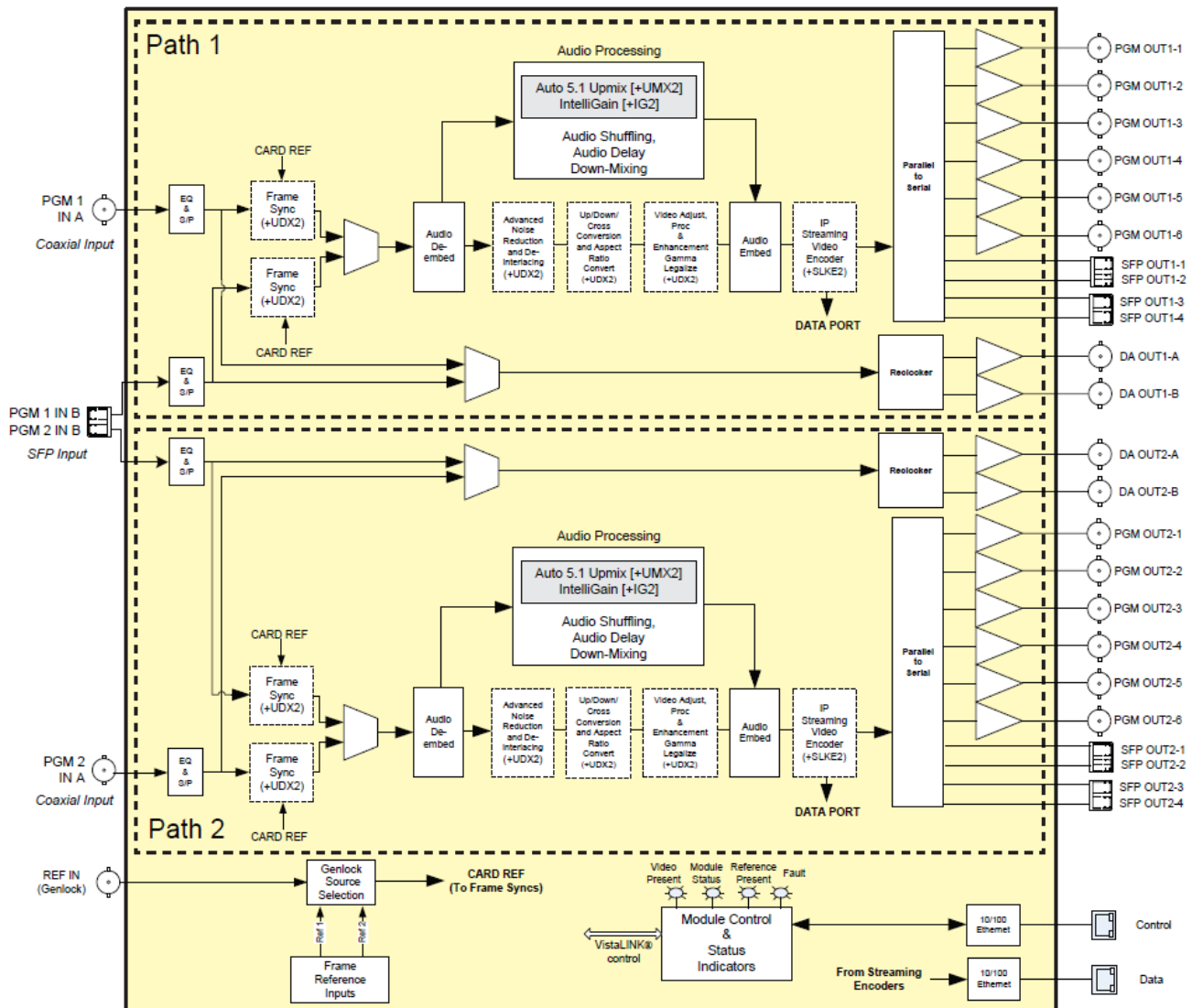
**1.1. PRODUCT OPTIONS**

This manual covers all variations and ordering options for the 7815VPDA series platform. There are a number of different possible configurations of the 7815VPDA. The supported product options can be easily described using the product formula below. All product configurations that satisfy the formula are valid, and are supported by the 7815VPDA series.

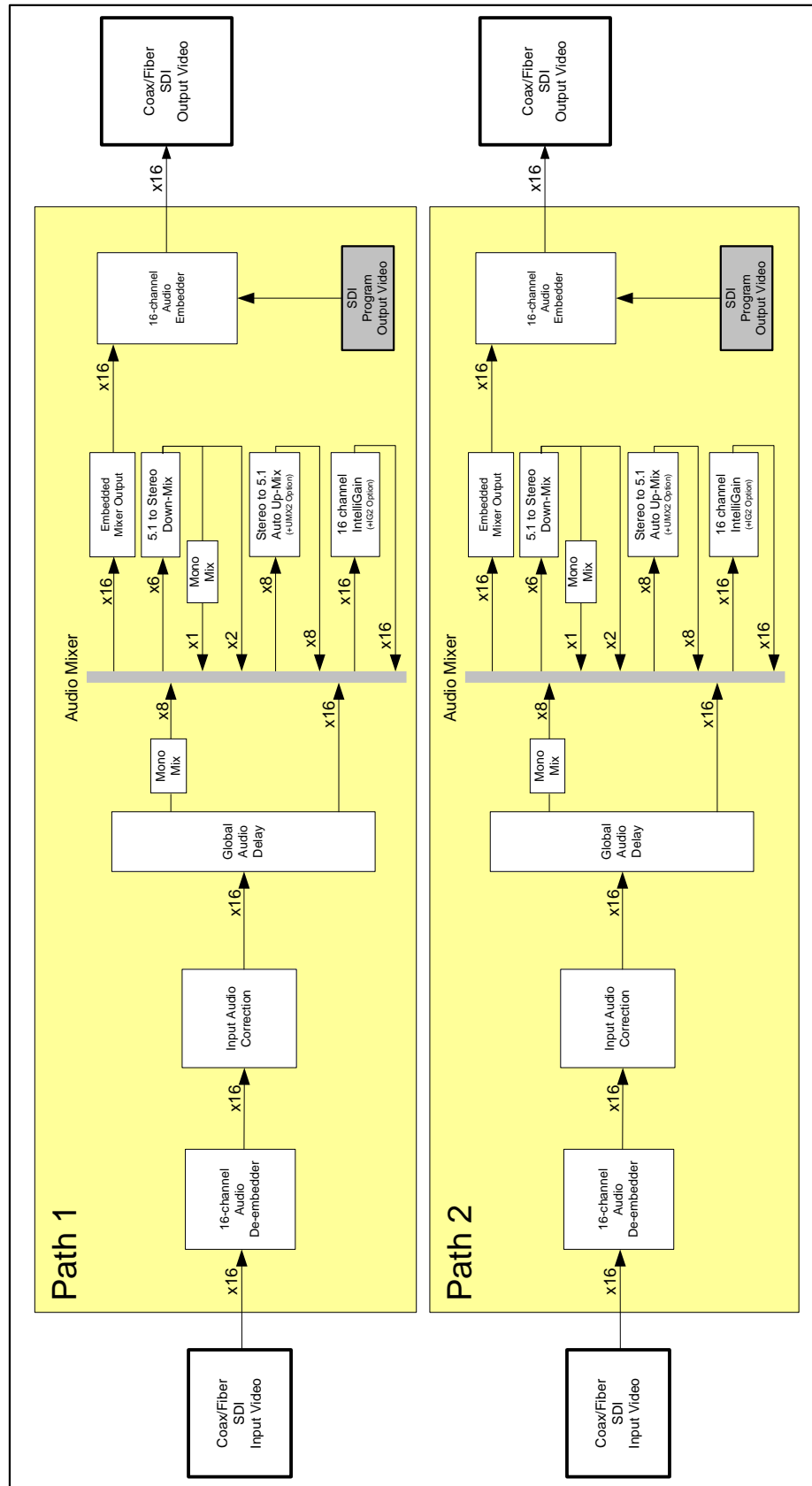
**7815VPDA {-HD/-3G}-F-2 [+UDX2] [+UMX2][+IG2][+SLKE2][SCTE104]**

Where:

- { } = Mandatory
- [ ] = Optional
- / = OR logic



**Figure 1-1 : 7815VPDA System Block Diagram**



**Figure 1-2 : 7815VPDA Audio Block Diagram**

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## 2. GETTING STARTED

All 7815 series modules come with a companion rear plate and occupy two slots in the 7800FR frame or three slots in the 7700FR-C. If a 7815 series module is installed in a 7700FR-C without the *slot blocker* installed, the card will not power-up and the LOCAL FAULT LED will be on. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR manual. Refer to Figure 2-1 for 7815 series rear plate layout.



**NOTE:** For proper operation in the 7700FR-C, the on-board *slot blocker* must be installed.



**NOTE:** The 7815IDA, 7847FSEDA and 7815VPDA all use an identical rear-plate. This allows 7815IDA or 7847FSEDA modules to be interchanged with 7815VPDA modules for additional video processing capabilities, such as Up/Down/Cross conversion and IP video encoding, without requiring a change to the backplane interconnect.

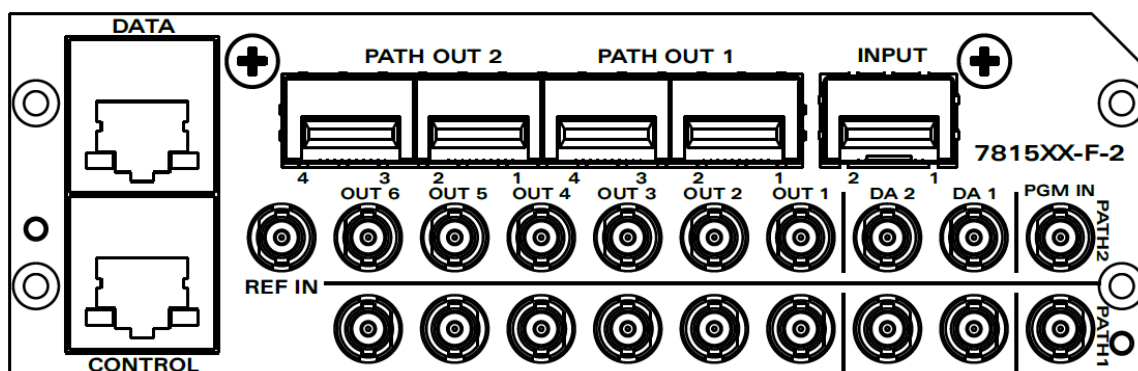


Figure 2-1 : 7815XX-F-2 Rear Plate Layout

## 2.1. INPUT / OUTPUT CONNECTIONS

- PGM IN:** Accepts a 10-bit serial digital video signal (SDI) compatible with SMPTE 259M, SMPTE 292M and SMPTE 425M. The module can be set to receive a specific video standard or set to automatically detect the supplied input video standard. PGM IN or FIBER IN can be selected for subsequent video processing.
- FIBER IN:** Accepts a 10-bit SDI compatible with SMPTE 259M, SMPTE 292M and SMPTE 425M. The module can be set to receive a specific video standard or set to automatically detect the supplied input video standard. PGM IN or FIBER IN can be selected for subsequent video processing.
- COAX OUT (1-6):** These BNC connectors are used to output 10-bit SDI compatible with SMPTE 292M, SMPTE 259M or SMPTE 425M.
- FIBER OUT (1-4):** These fiber connectors are used to output 10-bit SDI video compatible with SMPTE 292M, SMPTE 259M or SMPTE 425M.
- DA OUT (1-2):** These BNC connectors are used to output reclocked 10-bit SDI input video compatible with SMPTE 292M, SMPTE 259M or SMPTE 425M.
- REF IN:** This BNC is for connecting a bi-level or tri-level reference. Reference format is auto-detected by the module. Reference may also be supplied via the 7700FR-G and 7800FR FRAME REFERENCE inputs. User can select the reference source to be either the card's external reference or one of the FRAME REFERENCE BNC.

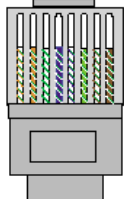


**NOTE:** The 7815VPDA series does not lock to external reference without the [+UDX2] product option. The external reference is only used for the extraction of time and date information from the VITC embedded in the external reference signal. With the [+UDX2] product option, full support for frame synchronization and phase alignment relative to an external reference signal is supported.

## 2.2. ETHERNET CONNECTIONS

All 7815 series modules are designed to use either 10Base-T (10 Mbps) or 100Base-TX (100 Mbps) also known as *Fast Ethernet*, twisted pair Ethernet cabling systems. When connecting for 10Base-T systems, category 3, 4, or 5 UTP cable as well as EIA/TIA – 568-100Ω STP cable may be used. When connecting for 100Base-TX systems, category 5 UTP cable is required. Make the network connection by plugging one end of a “straight through” cable into the RJ-45 receptacle of the 7815 modules and the other end into a port of the supporting hub. If you are connecting the 7815 series module directly to an Ethernet port on a computer, you will have to use a “crossover” cable.

Straight-through RJ-45 cables can be purchased or can be constructed using the pin out information in Table 2-1 for the current RJ-45 standards (AT&T 258A or EIA/TIA 258B colour coding shown). Also, refer to the notes following the table for additional wiring guide information.

	Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
	1	Transmit +	White/Green	White/Orange	X
	2	Transmit –	Green/White or White	Orange/White or Orange	X
	3	Receive +	White/Orange	White/Green	X
	4	N/A	Blue/White or Blue	Blue/White or Blue	Not used (required)
	5	N/A	White/Blue	White/Blue	Not used (required)
	6	Receive –	Orange/White or Orange	Green/White or Green	X
	7	N/A	White/Brown	White/Brown	Not used (required)
	8	N/A	Brown/White or Brown	Brown/White or Brown	Not used (required)

**Table 2-1 : Colour Code Wiring for the Current RJ 45 Standards**

Note the following cabling information for this wiring guide:

- Only two pairs of wires are used in the 8-pin RJ 45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory that they be present in the cable.
- 10BaseT and 100BaseT use the same pins; a crossover cable made for one will work with the other.
- Pairs may be solid colours and not have a stripe.
- Category 5 cables must use Category 5 rated connectors.

The maximum cable run between the 7815 series modules and the supporting hub is 300 ft (90 m).

Note that the two LEDs on the Ethernet connector are not used and will not light up when connected to an Ethernet network. Ethernet functionality is not impacted by the lack of these LEDs lighting up.

### 2.2.1. Ethernet Ports

**CONTROL:** This port is purposed for connection to the facilities control network. The network IP configuration can be setup for the CONTROL port in the IP tab of the VistaLINK<sup>®</sup> PRO 7815 module global configuration view.



**NOTE:** The 7815VPDA series does not currently support SNMP configuration via the CONTROL port. A 7700FC/7800FC must be used for module configuration.

**DATA:** This port is purposed for connection to the facilities data network. This port is only functional with the [+SLKE2] IP streaming video encoder product option. The network IP configuration can be setup for the DATA port in the IP tab of the VistaLINK<sup>®</sup> PRO 7815 module global configuration view.



**NOTE:** The 7815VPDA does not support configuration of the DATA port without the [+SLKE2] product option. The DATA port is used exclusively for IP streaming encoded video.

### 2.2.2. Ethernet Status LEDs

**GREEN LED:** The GREEN LED reports Link/Act activity. When it is GREEN FLASHING, traffic is present on the port (either Tx or Rx). When it is OFF, no activity is present on the port.

**YELLOW LED:** The YELLOW LED reports connection speed. When it is ON, a 1Gbps link has been established. When it is OFF, either a 10Mbps or 100Mbps link has been established.

### 3. SPECIFICATIONS

#### 3.1. SERIAL DIGITAL VIDEO INPUT

<b>Standard:</b>	2.970 Gb/sec SMPTE 425M
<b>Number of Inputs:</b>	1(PGM IN) <i>per video path</i>
<b>Connector:</b>	HD BNC 1.0/ DIN
<b>Signal Level:</b>	1V nominal
<b>Input Equalization:</b>	Automatic to 80m @ 2.970 Gbs with Belden 1694 or equivalent
<b>Return Loss:</b>	>15 dB to 1.5 GHz >10 dB to 3.0 GHz

#### 3.2. SERIAL DIGITAL VIDEO OUTPUT

<b>Standard:</b>	2.970 Gb/sec SMPTE 425
<b>Number of Outputs:</b>	6 (per video path)
<b>Connector:</b>	HD BNC 1.0/ DIN
<b>Signal Level:</b>	800mV Nominal
<b>SD Rise/Fall Times:</b>	740ps nominal
<b>HD Rise/Fall Times:</b>	200ps nominal
<b>Return Loss:</b>	>15 dB to 1.5 GHz >10 dB to 3.0 GHz

#### 3.3. OPTICAL DIGITAL VIDEO INPUT

<b>Module:</b>	Evertz SFP3R-2
<b>Number of Inputs:</b>	2 per module
<b>Connector:</b>	LC/UPC
<b>Fiber:</b>	Compatible with Singlemode or 50/62.5µm Multimode
<b>Operating Wavelength:</b>	1270nm to 1610nm
<b>Maximum Input Power:</b>	-1dBm
<b>Optical Sensitivity:</b>	-21dBm at 2.97GB/s pathological Level A -23dBm at 2.97GB/s colour bars

#### 3.4. OPTICAL DIGITAL VIDEO OUTPUT

<b>Module:</b>	Evertz SFP3T13-2 (Up to 4x modules)
<b>Number of Outputs:</b>	2 per module

<b>Connector:</b>	LC/UPC
<b>Fiber:</b>	Compatible with Singlemode or 50/62.5µm Multimode
<b>Optical Power:</b>	-2dBm ± 1dBm
<b>Operating Wavelength:</b>	1310nm

### **3.5. REFERENCE VIDEO INPUT**

<b>Type:</b>	HD Tri-Level sync, NTSC or PAL Colour Black 1 V p-p
<b>Connector:</b>	HD BNC/ DIN
<b>Termination:</b>	75 ohm ( <i>Termination is user configurable – enable / disable</i> )

### **3.6. ELECTRICAL**

<b>Voltage:</b>	+12VDC
<b>Power:</b>	45 Watts
<b>EMI/RFI:</b>	Complies with FCC regulations for class A devices. Complies with EU EMC directive

### **3.7. PHYSICAL**

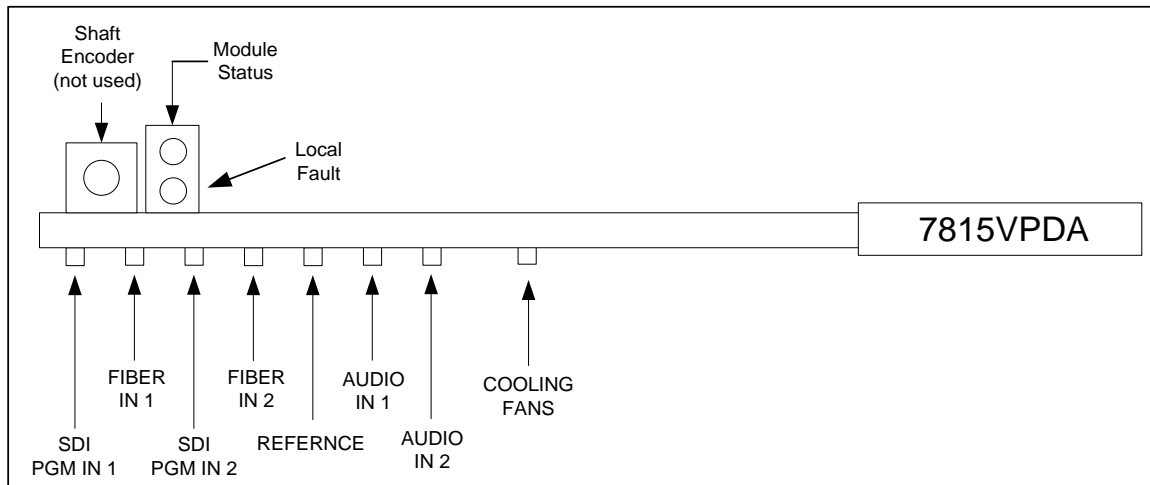
#### ***Number of slots***

<b>7800FR Frame:</b>	2
<b>7700FR-C Frame:</b>	3 (slot blocker must be installed for proper installation)

## 4. STATUS LEDS

### 4.1. MODULE STATUS LEDS

Figure 4-1 depicts status LEDs for the 7815VPDA series modules. LEDs are in the same position and perform the same function as the 7815IDA and 7847FSEDA series modules.



**Figure 4-1 : 7815VPDA Status LEDS**

- MODULE STATUS:** This Green MODULE STATUS LED will be ON when the module has valid video on one of its inputs.
- LOCAL FAULT:** This Red LOCAL FAULT LED will be ON when no valid video standard is detected on both input video paths.
- SDI PGM IN 1:** The SDI PGM IN 1 LED will be GREEN when a valid input standard is detected on SDI PGM IN for video path 1. OFF otherwise.
- FIBER IN 1:** The FIBER IN 1 LED will be GREEN when a valid input standard is detected on FIBER IN for video path 1. OFF otherwise.
- SDI PGM IN 2:** The SDI PGM IN 2 LED will be GREEN when a valid input standard is detected on SDI PGM IN for video path 2. OFF otherwise.
- FIBER IN 2:** The FIBER IN 2 LED will be GREEN when a valid input standard is detected on FIBER IN for video path 2. OFF otherwise.
- REFERENCE:** The REFERENCE LED will be GREEN when a valid reference video standard is detected. OFF otherwise.
- AUDIO IN 1:** The AUDIO IN 1 LED will be GREEN when embedded audio group 1 is present on the input video standard signal processed by video path 1. OFF otherwise.
- AUDIO IN 2:** The AUDIO IN 2 LED will be GREEN when embedded audio group 1 is present on the input video standard signal processed by video path 2. OFF otherwise.

**COOLING FANS**

The COOLING FANS LED will be GREEN when both cooling fans are operating properly. OFF when either fan or both fans are in error.



## 5. VISTALINK PRO INTERFACE

The 7815 series products are controlled using VistaLINK<sup>®</sup> PRO. VistaLINK<sup>®</sup> PRO operates using Ethernet and SNMP control protocols. The 7815 series modules DO NOT HAVE card edge controls. As a result, 7700FC/7800FC modules must be installed in all frames that house 7815 series modules.

Within VistaLINK<sup>®</sup> PRO the 7815VPDA series modules have a set of system configuration controls, as well as groups of controls designated for each of the two independent video processing paths. The system configuration controls can be accessed by *right-clicking* on the module in the VistaLINK<sup>®</sup> PRO hardware tree, and selecting *view configuration*. The video path configuration controls can be accessed by expanding the 7815VPDA module subtree (*click on the '+' symbol beside the module name in the VistaLINK<sup>®</sup> PRO hardware tree*), then *right-clicking* on the desired video path (*Video Path 1 or Video Path 2*) and selecting *view configuration*. Figure 5-1 illustrates how a 7815VPDA module will appear in the in the VistaLINK<sup>®</sup> PRO hardware tree.

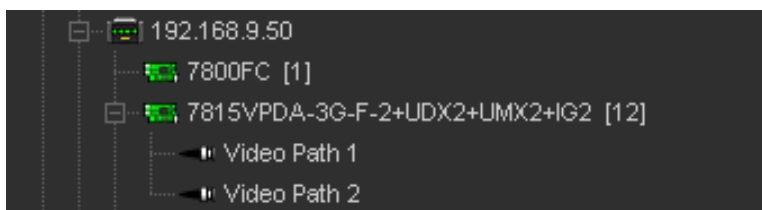


Figure 5-1 : 7815VPDA in VistaLINK<sup>®</sup> PRO Hardware Tree



**NOTE:** When using VistaLINK<sup>®</sup> PRO it is important to ensure that the most recent 7815 series “.JAR” control file is installed. See Section 8.2 for details on how to upgrade the 7815 series VistaLINK<sup>®</sup> PRO JAR file.

## 5.1. SYSTEM CONFIGURATION

### 5.1.1. General

The General control tab reports system status monitoring and version information. This includes module temperature and active cooling fan statuses. Additionally, when the module contains the [+SLKE2] product option, this tab also reports the video encoder temperature and active cooling fan status.

Figure 5-2 illustrates the layout of the general system status information in the VistaLINK<sup>®</sup> PRO global configuration view.



**NOTE:** If any of the cooling fan status reports a failure, the module should be powered down immediately to avoid overheating and subsequent damage to the module. Contact Evertz for further assistance in replacing the failed modules.

Global Traps	
Enable	Status
<input checked="" type="checkbox"/> Temperature	<span style="color: green;">■</span> Temperature
<input checked="" type="checkbox"/> Cooling Fan Module 1	<span style="color: green;">■</span> Cooling Fan Module 1
<input checked="" type="checkbox"/> Cooling Fan Module 2	<span style="color: green;">■</span> Cooling Fan Module 2
<input checked="" type="checkbox"/> Video Encoder Fan	<span style="color: green;">■</span> Video Encoder Fan
<input checked="" type="checkbox"/> Video Encoder Temperature	<span style="color: green;">■</span> Video Encoder Temperature

Version Information	
Firmware Version	5.20 build 643
Video Encoder Version	3.13 build 268 (VERIFIED)

**Figure 5-2 : System Configuration - General**

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

#### Global Traps

**Temperature:** This trap will alarm when the temperature of the modules exceeds 78°C.

**Cooling Fan Module:** This trap will alarm when there is a fan failure detected.

**Video Encoder Fan [+SLKE2]:** This trap will alarm when there is a fan failure detected on the video encoder sub-board.

**Video Encoder Temperature [+SLKE2]:** This trap will alarm when the temperature of the video encoder sub-board exceeds 70°C.

## Version Information

**Firmware Version:** Reports the active firmware version running on the main processing module.

**Video Encoder Version [+SLKE2]:** Reports the active firmware version running on the video encoder module. This status will also report *VERIFIED* when the video encoder version matches the version required by the firmware running on the main processing module, and *MISMATCHED* when the version is incorrect.



**NOTE:** If the Video Encoder Version reports *MISMATCHED* even after rebooting the module, Contact Evertz for further assistance. Proper functionality is only guaranteed when the firmware versions properly match.

### 5.1.2. Reference

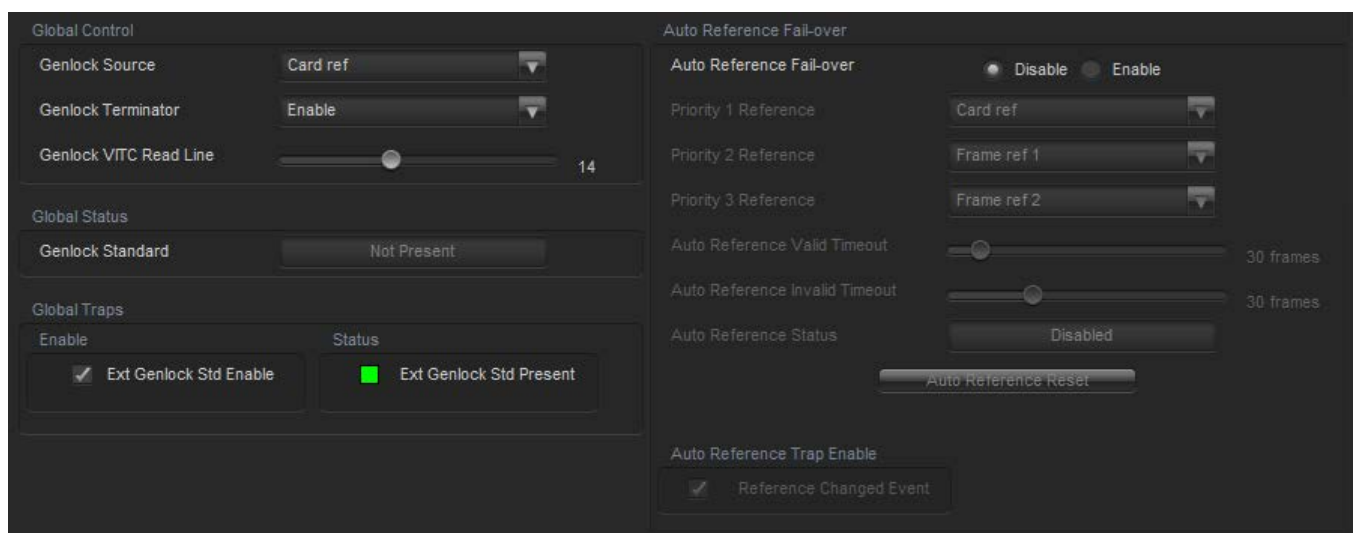
The reference control tab contains all controls that configure the operation of the reference processing from a module level. Additional controls that are specific to each video processing path are located in the corresponding video configuration view Reference control tab.

The video reference signal can be sourced from either the modules REF input connection on the rear plate, or either of the FRAME REF inputs on the 7800FR or 7700FR-G frames.

The 7815VPDA series supports locking to 525i/59.94Hz and 625i/50Hz bi-level reference signals, and 1080i/59.94Hz and 1080i/50Hz tri-level reference signals.

The auto-reference fail-over feature is used to automatically lock to secondary (*lower priority*) reference input signals when the main (*priority 1*) reference drops out. This improves robustness of the system, and ensures the output timing remains locked to the desired reference timing in the event of failure on the primary reference input.

Figure 5-3 illustrates the layout of the reference controls in the VistaLINK® PRO global configuration view.



**Figure 5-3 : System Configuration - Reference**

### Global Control

**Genlock Source:** This control is used to configure which reference input connector is selected as the Genlock input signal. When **Card Ref** is selected, the module will be sourced by the external reference signal applied to the module's rear panel. When **Frame 1** is selected, the module will lock to the external reference applied to the 7800 frame **REF 1** input. When **Frame 2** is selected, the module will be sourced by the external reference applied to the 7800 frame **REF 2** input.

**Genlock Terminator:** This control specifies if a 75 ohm termination is applied to the input reference signal.

**Genlock VITC Read Line:** This control specifies the line number where VITC time code will be extracted from the input reference signal.

### Global Status

**Genlock Standard:** This field displays if a valid video reference has been detected on the selected reference input. It reports the detected reference video standard when a valid reference is applied.

### Global Traps

**External Genlock Std Present:** Enabling this trap will trigger a fault when an external genlock signal is either not present or the module is unable to detect a valid supported reference video standard.

### Auto Reference Fail-over

By enabling this option the user will set enable automatic reference failover for the device in the case of a loss of reference.

**Priority 1 Reference:** This control allows the user to set the main reference. If present, this reference will be used as the source to the module.

**Priority 2 Reference:** This control allows the user to set the second reference in the case of a failure or loss of the priority 1 reference signal.

**Priority 3 Reference:** This control allows the user to set the third reference in the case of a failure or loss of the priority 1 and 2 reference signals.

**Auto Reference Valid Timeout:** This control allows the user to select the amount of time (in frames) a reference has to be valid before it is considered to be present and can be locked to.

**Auto Reference Invalid Timeout:** This control allows the user to select the amount of time (in frames) a reference has to be missing before it is considered to be absent.

**Auto Reference Status:** This field displays the active priority and reference source of the auto reference failover.

**Auto Reference Trap Enable:** This field allows the user to enable an event trap which will notify of any changes in the reference source.

### 5.1.3. IP

The IP tab presents the 7815VPDA networking configuration controls. Figure 5-4 illustrates the IP controls as presented in the IP tab of the global configuration view.



**NOTE:** The 7815VPDA does not support configuration of the DATA port without the [+SLKE2] product option. The DATA port is used exclusively for IP streaming encoded video.

Control IP Configuration					Data (Video Encoder) IP Configuration				
IP Address	172	16	196	152	IP Address	192	168	10	121
Subnet Mask	255	255	255	0	Subnet Mask	255	255	255	0
Default Gateway	172	16	196	1	Default Gateway	0	0	0	0

**Figure 5-4 : System Configuration - IP**

**IP Address:** This control allows the user to assign an IP address to the CONTROL or DATA port of the 7815VPDA card.

**Netmask Address:** This control allows the user to define the Netmask/Subnet for the CONTROL or DATA port.

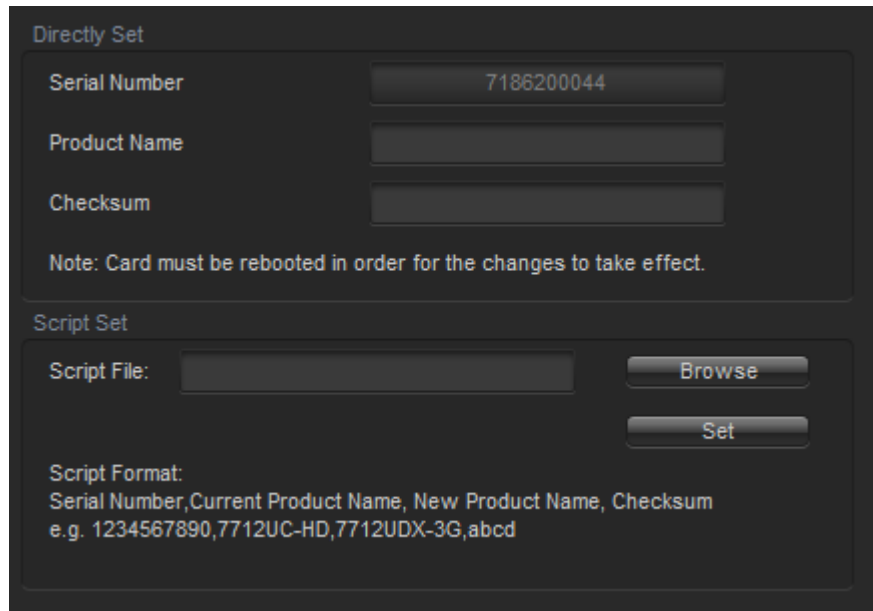
**Gateway Address:** This control allows the user to define the Gateway/Router address for the CONTROL or DATA port, which will allow the card to communicate with devices on other networks.

### 5.1.4. Change Product

This configuration tab provides the ability to perform product string changes. There are a number of product options on the 7815VPDA. Product options can be added to a 7815VPDA at any point using these configuration controls. Figure 5-5 illustrates the layout of the controls in the VistaLINK® PRO global configuration view.



**NOTE:** A unique checksum must be generated to support a product string change on the 7815VPDA. Please contact Evertz if you are interested in upgrading the feature set of your 7815VPDA.



**Figure 5-5 : System Configuration - Change Product**

### **Directly Set**

**Serial Number:** The serial number is loaded by the manufacturer and is displayed here (read-only).

**Product Name:** The product name entry area will be used to enter in the name of the product that the module will be upgraded to.

**Checksum:** The checksum location will contain the verification code that the Evertz sales department will provide when the options have been purchased.



**NOTE:** The Product name and the checksum NEED to be entered the exact same way as provided by the Sales department or the process will not work.

### **Script Set**

**Script File:** When upgrading multiple 7815 cards a script file can be used to make the upgrade process easier. The required format of the script file is:

`<board serial number>,<current product string>,<new product string>,<checksum>`

If using a script file for upgrading the product string, follow these steps:

1. Browse to the location of the file on your computer
2. Press set to send the script file to the card.

### 5.1.5. Fiber RX

The Fiber RX tab contains all control and status related to the optical fiber SFP receiver. If the Fiber receiver SFP is not installed in the correct location on the 7815VPDA rear-plate, the status will report 'Not detected' and 'N/A'.

Figure 5-6 illustrates the layout of the controls in the VistaLINK® PRO global configuration view.

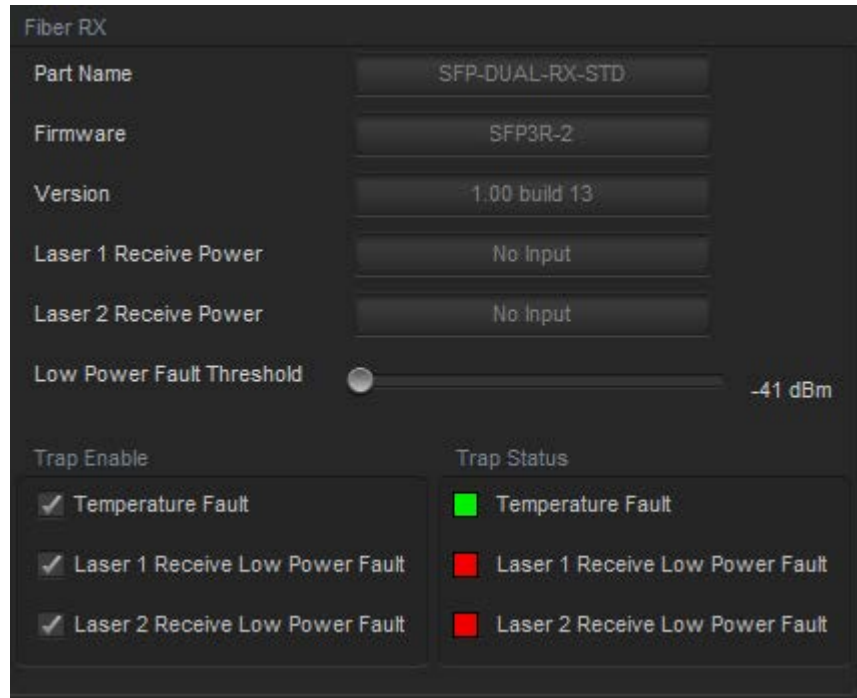


Figure 5-6 : System Configuration - Fiber RX

#### Fiber RX

**Part Name:** This field displays the part name for the detected SFP fiber module.

**Firmware:** This field displays the current firmware type running on the SFP fiber module.

**Version:** This field displays the current firmware version of the SFP fiber modules.

**Laser 1 Receive Power:** This field reports laser 1 received power measured by the SFP in dBm.

**Laser 2 Receive Power:** This field reports laser 2 received power measured by the SFP in dBm.

**Low Power Fault Threshold:** This control allows the user to set the receive power threshold below which the low power faults will be triggered for either laser 1 and/or laser 2.

#### Trap Enable and Trap Status

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

**Temperature Fault:** This trap will trigger when the receiver module exceeds 100°C.

**Laser Receive Low Power Fault:** This trap will trigger when the receiver power level drops below the *Low Power Fault Threshold* specified above.

### 5.1.6. Fiber TX

The Fiber TX tab contains all control and status related to the optical fiber SFP transmitters. The 7815VPDA supports up to 4 SFP modules (2 modules per video path). If the Fiber transmitter SFP is not installed in the specific location on the 7815VPDA rear-plate, the status will report 'Not detected' and 'N/A'.

Figure 5-7 illustrates the layout of the controls in the VistaLINK<sup>®</sup> PRO global configuration view.

Fiber Tx Module Select: ☒ Path 1 – Out 1 & 2 ☐ Path 1 – Out 3 & 4 ☐ Path 2 – Out 1 & 2 ☐ Path 2 – Out 3 & 4

Fiber Tx – Path 1 – Outputs 1 & 2

Part Name	7700SFPTX2
Firmware	SFP3T13-2
Version	1.00 build 43
Laser 1 Wavelength	1310 nm
Laser 2 Wavelength	1310 nm

Trap Enable	Trap Status
<input checked="" type="checkbox"/> Temperature Fault	<input checked="" type="checkbox"/> Temperature Fault
<input checked="" type="checkbox"/> Laser 1 Fault	<input checked="" type="checkbox"/> Laser 1 Fault
<input checked="" type="checkbox"/> Laser 2 Fault	<input checked="" type="checkbox"/> Laser 2 Fault

**Figure 5-7 : System Configuration - Fiber TX**

**Fiber Tx Module Select:** These option buttons select which fiber SFP transmitter controls to actively display.

**Part Name:** This field displays the part name for the detected SFP fiber module.

**Firmware:** This field displays the current firmware type running on the SFP fiber module.

**Version:** This field displays the firmware version of the SFP fiber modules.

**Laser 1 Wavelength:** This field reports the transmitted wavelength of laser 1 in nanometres (nm).

**Laser 2 Wavelength:** This field reports the transmitted wavelength of laser 2 in nanometres (nm).

#### Trap Enable and Trap Status

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

**Temperature Fault:** This trap will trigger when the transmitter module exceeds 100°C.

**Laser Fault:** This trap will trigger when the transmitter detects a fault in either of the lasers.

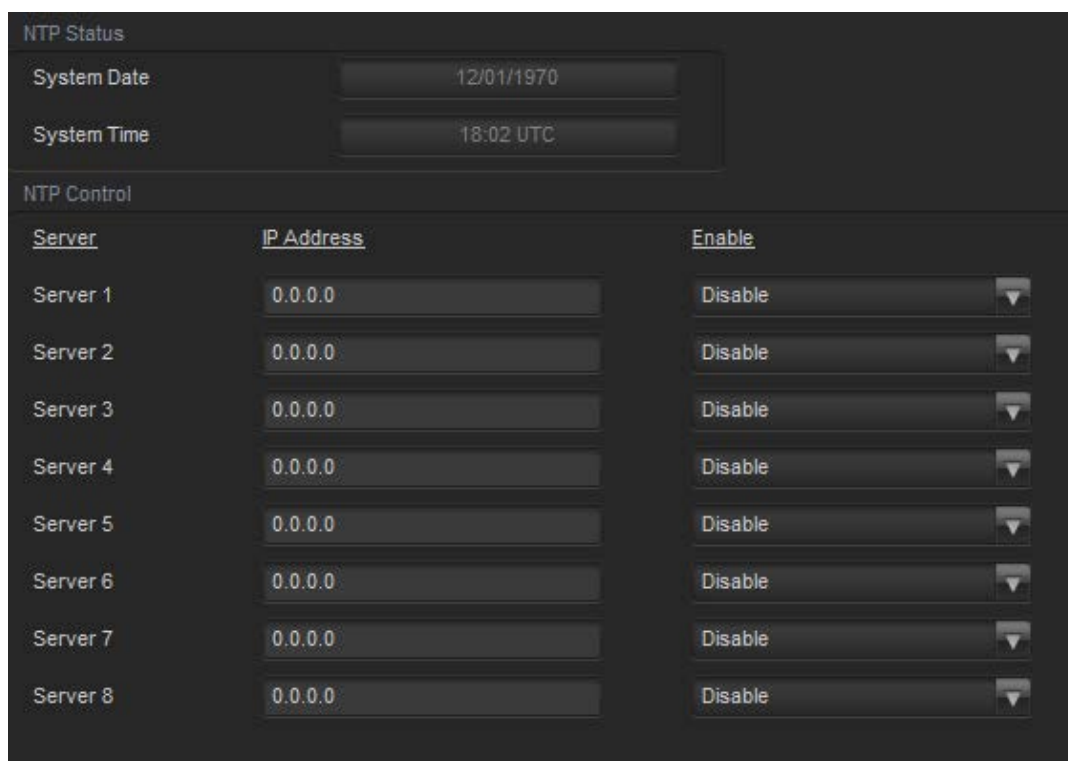


### 5.1.7. NTP [+UDX2]

The 7815VPDA with the [+UDX2] product option supports Network Time Protocol (NTP) synchronization of the module's system time. This feature allows the module to obtain an accurate system time by synchronizing with multiple NTP servers. The 7815VPDA does not contain a real-time clock, and must synchronize its time on power-up in-order to maintain accurate system time during module operation.

Additionally, the 7815VPDA with the [+UDX2] product option can select system time as the source of time code to be embedded on the output video signal. In order for the 7815VPDA to provide accurate time code output the system time must be appropriately synchronized to accurate NTP servers.

The NTP tab contains all the controls related to NTP system clock synchronization. Figure 5-8 illustrates the layout of the controls in the VistaLINK® PRO global configuration view. The *NTP* feature is only valid for the [+UDX2] product option. As such, this tab will only be visible in VistaLINK® PRO for modules with the [+UDX2] product option.



NTP Status		
System Date	12/01/1970	
System Time	18:02 UTC	
NTP Control		
Server	IP Address	Enable
Server 1	0.0.0.0	Disable
Server 2	0.0.0.0	Disable
Server 3	0.0.0.0	Disable
Server 4	0.0.0.0	Disable
Server 5	0.0.0.0	Disable
Server 6	0.0.0.0	Disable
Server 7	0.0.0.0	Disable
Server 8	0.0.0.0	Disable

Figure 5-8 : System Configuration - NTP

#### NTP Status

**System Date:** This control reports the current system date, in <dd/mm/yyyy> format.

**System Time:** This control reports the current system time, in <hh:mm Timezone> format.

#### NTP Control

**IP Address:** This control sets the NTP server IP addresses that will be used for system clock synchronization. A maximum of 8 NTP servers can be specified. The NTP server will be used for the system clock synchronization only if *Enabled*.

**Enable:** This control enables or disables the usage of the associated NTP server for system clock synchronization.

#### 5.1.8. Time Code [+UDX2]

The 7815VPDA with the [+UDX2] product option supports system time as a source of output time code. With the use of NTP system clock synchronization, the 7815VPDA can embed an accurate time-of-day into the output video signal in any of the supported time code output formats. The system time code can also embed date (BCD or MJD) and time zone information according to SMPTE-309M.

The Time Code tab contains all the global configuration controls related system time code. Figure 5-9 illustrates the layout of the controls in the VistaLINK<sup>®</sup> PRO global configuration view. The *System Time Code* feature is only valid for the [+UDX2] product option. As such, this tab will only be visible in VistaLINK<sup>®</sup> PRO for modules with the [+UDX2] product option.



**NOTE:** These Time Code controls do not affect the processing of embedded input time code (D-VITC, ANC-LTC, ANC-VITC). They only apply to the system time code.

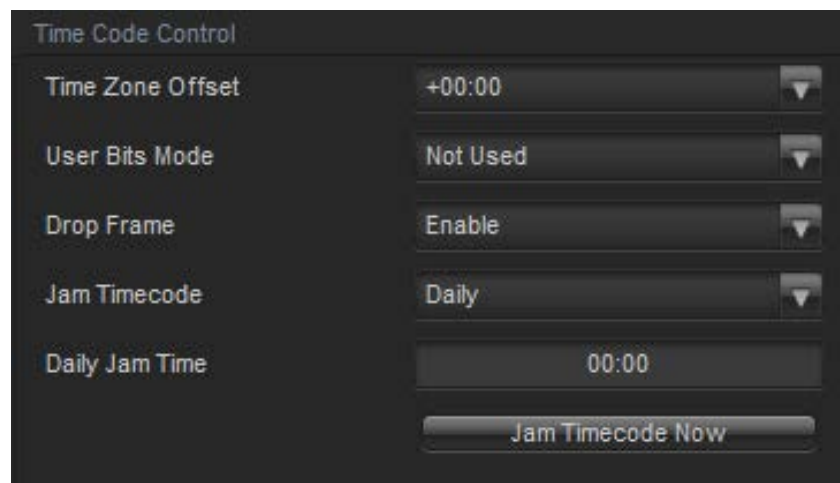


Figure 5-9 : System Configuration - Time Code

#### Time Code Control

**Time Zone Offset:** This control sets the time zone offset to be used for the system time code with respect to UTC. If *System Time* is selected as a source for output time code, the embedded time code on the output video will be offset from UTC according to the value of this control.

**User Bits Mode:** This control sets the time code user bit mode of operation for *system time code*. The user bits can be used to transmit date and time zone information using ether MJD format (by selecting *MJD Date*) or BCD format (by selecting *BCD Date*) according to SMPTE-309M, or they can be not used (by selecting *Not Used*).

**Drop Frame:** This control enables / disables drop frame processing on system time code.



**NOTE:** Drop frame processing will be applied to the system generated time code only for non-integer frame rates.

**Jam Timecode:** This control sets whether the system time code will be jammed daily at the specified *Daily Jam Time* or never jammed.

**Daily Jam Time:** This control sets the time of day to jam the time code when *Jam Timecode* is set to *Daily*. The time of day string must be entered in 24 hour <hh:mm> format to be valid.

**Jam Timecode Now:** This button forces an immediate jam of the system time code to the current system time.

## 5.2. VIDEO PATH CONFIGURATION

### 5.2.1. Video

The Video tab contains all controls related to core video configuration as well as basic monitoring information regarding the input video sourced to the 7815VPDA. Figure 5-10 illustrates the layout of the controls in the VistaLINK<sup>®</sup> PRO configuration view.

**Figure 5-10 : Video Path Configuration - Video**

**Video Std Input:** This control allows the user to select the input video standard being used.

‘Auto’ mode dynamically detects the input video standard, and configures the 7815VPDA accordingly. Otherwise, when set to a specific video standard, the 7815VPDA will only pass the video when the expected video standard is provided on its input.

Interlaced video rates are listed in fields per second. Progressive video rates are listed in frames per second. Table 5-1 lists all supported input video standards.

1080i/59.94Hz
720p/59.94Hz
525i/59.94Hz
1080i/50Hz
720p/50Hz
625i/50Hz
1080p/59.94Hz (425M level A) [-3G option only]
1080p/59.94Hz (425M level B) [-3G option only]
1080p/50Hz (425M level A) [-3G option only]
1080p/50Hz (425M level B) [-3G option only]

**Table 5-1 : Video - Supported Input Video Standards**

**Video Standard (Std) Output (+UDX2):** This control allows the user to select the desired output standard produced by the 7815VPDA module. This control is only valid for the [+UDX2] product option, where up/down/cross conversion is supported. Without the [+UDX2] product option, the output video standard will always match the input video standard.

Table 5-2 lists all supported video conversions with the [+UDX2] product option. Input Video standards listed in the first column can be converted to any video standard in the second column within the same row of the table below.

Input Video Standards	Output Video Standards
525i/59.94Hz 720p/59.94Hz 1080i/59.94Hz 1080p/59.94Hz (425M level A) [-3G option only] 1080p/59.94Hz (425M level B) [-3G option only]	525i/59.94Hz 720p/59.94Hz 1080i/59.94Hz 1080p/59.94Hz (425M level A) [-3G option only] 1080p/59.94Hz (425M level B) [-3G option only]
625i/50Hz 720p/50Hz 1080i/50Hz 1080p/50Hz (425M level A) [-3G option only] 1080p/50Hz (425M level B) [-3G option only]	625i/50Hz 720p/50Hz 1080i/50Hz 1080p/50Hz (425M level A) [-3G option only] 1080p/50Hz (425M level B) [-3G option only]

**Table 5-2 : Video - Supported Input to Output Video Standard Conversions [+UDX2]**

**Video Input Source:** This control selects whether the input video will be sourced from either the SDI input or the Fiber input. When in 'Auto' mode, the 7815VPDA will automatically select the input video based on video presence. The SDI input is given priority over the Fiber input when both inputs are present.

Additionally, while in 'Auto' mode, Fiber can act as a backup input if the SDI input fails.



**NOTE:** The Video Input Source control handles the routing for the program outputs ONLY. A separate control (DA Output Video Source) is used to handle the routing for the DA outputs.

**DA Output Video Source:** This control selects whether the DA output video will be sourced from either the SDI input or the Fiber input. When in 'Auto' mode, the 7815VPDA will automatically select the input video based on video presence. The Fiber input is given priority over the SDI input when both inputs are present.

Additionally, while in 'Auto' mode, SDI can act as a backup input if the Fiber input fails.



**NOTE:** The DA Output Video Source control handles the routing for the DA outputs ONLY. A separate control (Video Input Source) is used to handle the routing for the program outputs.

**SD Blanking – 525i/59.94 (+UDX2):** This control allows the user to adjust which lines of 525i/59.94Hz input video will be blanked prior to performing any video processing on the input signal. The supported blanking ranges from None to Blanking to first three lines of active picture (lines 20 to 23 for 525i/59.94Hz). It is customary to blank line 21 where closed caption information may be present. Note that the caption translation process will still occur as expected even when line 21 is blanked. This control simply prevents caption waveforms from being processed as video. This control is only valid for the [+UDX2] product option.

**SD Blanking – 625/50 (+UDX2):** This control allows the user to adjust which lines of 625i/50Hz will be blanked prior to performing any video processing on the input signal. The supported blanking ranges from None to Blanking to first three lines of active picture (lines 23 to 26 for 625i/50Hz). It is customary to blank line 23 where closed caption information may be present. Note that the caption translation process will still occur as expected even when line 23 is blanked. This control simply prevents caption waveforms from being processed as video. This control is only valid for the [+UDX2] product option.

**Vertical Phase Offset:** This control allows the user to set the vertical timing of the output video with respect to the reference input set by the *Reference Select* control. There are independent V Phase Offset controls for each video path. Setting *V Phase Offset* = 0 maintains the vertical timing alignment of the output video with respect to the reference input. Increasing the value of *V Phase Offset* will delay the output video in one-line increments of the output video standard. In order to advance the vertical timing of the output video with respect to the reference, set the control to its maximum value minus the number of lines that you wish to advance the output video with respect to reference.

**Horizontal Phase Offset:** This control allows users to set the horizontal timing of the output video with respect to the reference input set by the *Reference Select* control. There are independent H Phase Offset controls for each video path. Setting *H Phase Offset* = 0 maintains the horizontal timing alignment of the output video with respect to the reference input. Increasing the value will delay the output video in one-sample increments of the output video standard. In order to advance the horizontal timing of the output video with respect to the reference, set the control to its maximum value minus the number of samples that you wish to advance the output video with respect to reference.

**Added Video Delay:** This control is used to add additional frames of delay to the video. Up to an additional 12 frames of delay can be added.



**NOTE:** The audio delay will always track the video delay. If additional frames of video delay are added, the audio delay will automatically adjust accordingly.

**Loss of Video Mode:** This control defines the action that will be taken when the input video is lost. Options include freezing output video on the last good frame of input video, or forcing the output video to black or blue.

**Force Freeze Frame:** This control allows the user to manually freeze frame the output video.

### **Video Monitor**

The *Video Monitor* section enables the user to view the status of video related parameters. Each video status is used to report the following information:

**SDI Video Standard:** This field reports the currently detected video standard on the SDI input. If the module is unable to detect a valid input standard, it will report 'Not present'

**Fiber Video Standard:** This field reports the currently detected video standard on the Fiber input. If the module is unable to detect a valid input standard, it will report 'Not present'

**Video Input Source:** This field reports which input is actively sourcing the program outputs. It will report either SDI or Fiber.

**DA Output Video Source Status:** This field reports which input is actively sourcing the DA outputs. It will report either SDI or Fiber.

**Video Payload ID:** This field reports the detected video payload ID on the incoming video. The information is displayed according to SMPTE 352 descriptions.

**Video Delay:** This field reports the active video processing delay/latency through the module in milliseconds (ms).

### **Video Traps**

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

**SDI Video Present:** This trap will trigger when the SDI video is no longer present.

**Fiber Video Present:** This trap will trigger when the video is no longer present on fiber.

### 5.2.2. Video Monitoring

The 7815 series modules support advanced audio & video monitoring, referred to as AVM. This advanced monitoring includes metrics for detecting potential issues in the video signal.

Figure 5-11 illustrates the layout of the controls in the VistaLINK<sup>®</sup> PRO configuration view.

Figure 5-11 : Video Path Configuration - Video Monitoring

#### AVM Core Processing Controls

**AVM Processing:** This control *enables/disables* the audio/video monitoring processing. This provides a simple way of disabling AVM processing and trap alarm reporting if it is not desired.

**Monitoring Location:** This control specifies where the AVM processing is performed. When set to *Input*, the AVM monitoring is performed on the input audio/video signals into the device. This mode would be desirable to qualify incoming signals, and detect errors when present on the input. When set to *Output*, the AVM monitoring is performed on the output audio/video signals of the device. This mode provides the ability to not only detect errors, but also potentially correct them (i.e. black level, white level, audio silence) using the built-in audio/video processing on the module. With proper adjustment, the reported AVM error should clear without requiring adjustments on an upstream device.

#### Video Fault Controls

**Video Error Duration:** This control sets the number of consecutive video frames that must contain video errors (Line length & synchronization errors) before triggering a video errors fault condition. The value range is from 0 to 900 frames in increments of 1.



**Video Error Timeout:** This control sets the timeout, in seconds that must elapse to consecutive error-free video frames before the video errors fault will be cleared. The value range is from 1 to 127 seconds in increments of 1 second.

**Video Black Duration:** This control sets the number of consecutive video frames that must contain active picture content below 7 IRE before triggering a video black fault condition. The value range is from 4 to 9996 frames in increments of 4 video frames.

**Video Black Timeout:** This control sets the timeout, in seconds that must elapse to consecutive video frames **without** active picture content below 7 IRE before the video black fault will be cleared. The value range is from 1 to 127 seconds in increments of 1 second.

**Video Frozen Duration:** This control sets the number of consecutive video frames that must contain video activity under the video noise level before triggering a video frozen fault condition. The value range is from 6 to 9998 frames in increments of 4 video frames.

When increasing the *Video Noise Level*, it is recommended that the *Video Frozen Duration* is increased as well. This is because the higher the picture noise level, the lower the equipment's motion sensitivity, thus long periods without significant on-screen movement are more likely to trigger a "false" freeze alarm.

**Video Frozen Timeout:** This control sets the timeout, in seconds that must elapse to consecutive video frames **without** video activity under the video noise level before the video frozen fault will be cleared. The value range is from 1 to 127 seconds in increments of 1 second.

**Video Noise Level:** This control sets the approximate level of noise expected in the video signal feed. It is used by the video frozen detection feature to distinguish motion from background noise on top of a video feed. The value range is from 1 to 10.

As a guide, here is some signal to noise ratio comparisons:

- 1 = digital freeze (no noise on top of frozen picture)
- 10 = 40 dB SNR

### **Video Level Fault Controls**

**Error Quantity:** This control sets the percentage of active picture content that must be too white (over) or too black (under) to be considered an error. The center section of the active picture of a field of video is analyzed and a total number of pixels in error are calculated. A fault is generated when the error quantity is above this level. The following options are available: Any, 0.01%, 0.1%, 1%, 10% and 20%. A selection of *any* will cause a fault if any video sample is over/under the set threshold.

**Black Error Level:** This control sets the amplitude of active picture content (in IRE) below which a pixel is considered too black. The value range is from -6.849 IRE to 7.192 IRE.

The center section of the active picture of a field of video is analyzed and a total number of pixels below this level are calculated. The field of video is considered to be **in error** when the number of pixels below the *black error level* exceeds the number of pixels (threshold) defined by the *Error Quantity* control.

**White Error Level:** This control sets the amplitude of active picture content (in IRE) above which a pixel is considered too white. The value range is from 94.977 IRE to 109.018 IRE.

The center section of the active picture of a field of video is analyzed and a total number of pixels above this level are calculated. The field of video is considered to be **in error** when the number of pixels above the *white error level* exceeds the number of pixels (threshold) defined by the *Error Quantity* control.

**Black/White Level Error Duration:** This control sets the number of seconds of consecutive video fields/frames that must be flagged as having black/white level errors before triggering the corresponding black/white level error fault condition. The value range is from 1 to 127 seconds in increments of 1 second.

**Black/White Level Error Timeout:** This control sets the number of seconds of consecutive video fields/frames that **must not be flagged** as having black/white level errors before the corresponding black/white level error fault will be cleared. The value range is from 1 to 127 seconds in increments of 1 second.

**Black Warning Level:** This control sets the amplitude of active picture content (in IRE) below which a pixel is considered to be normal black content within the active picture. The value range is 7.306 IRE to 38.242 IRE.

The center section of active picture of a field of video is analyzed and a total number of pixels below this level are calculated. The field of video is considered to be **in error** when the number of pixels below the *Black Warning Level* is below the number of pixels (threshold) defined by the *Error Quantity* control.

**White Warning Level:** This control sets the amplitude of active picture content (in IRE) above which a pixel is considered to be normal white content within the active picture. The value range is from 38.356 IRE to 94.863 IRE.

The center section of active picture of a field of video is analyzed and a total number of pixels above this level are calculated. The field of video is considered to be **in error** when the number of pixels above the *White Warning Level* is below the number of pixels (threshold) defined by the *Error Quantity* control.

**Black/White Level Warning Duration:** This control sets the number of seconds of consecutive video fields/frames that must be flagged as having black/white level warnings before triggering the corresponding black/white level warning fault condition. The value range is from 1 to 127 seconds in increments of 1 second.

**Black/White Level Warning Timeout:** This control sets the number of seconds of consecutive video fields/frames that **must not be flagged** as having black/white level warnings before the black/white level warning fault will be cleared. The value range is from 1 to 127 seconds in increments of 1 second.

### Trap Enable and Trap Status

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

**Video Errors:** This trap will **trigger** when a set of consecutive input video frames of length greater than *Video Error Duration* all contain video errors. This trap will **clear** when a set of consecutive input video frames of length greater than *Video Error Timeout* are video error-free.

**Video Black:** This trap will trigger when a set of consecutive input video frames of length greater than *Video Black Duration* all contain active picture content below 7 IRE. This trap will **clear** when a set of consecutive input video frames of length greater than *Video Black Timeout* do not contain active picture content below 7 IRE.

**Video Frozen:** This trap will trigger when a set of consecutive input video frames of length greater than *Video Frozen Duration* all contain video activity (*motion*) below the video noise level. This trap will **clear** when a set of consecutive input video frames of length greater than *Video Frozen Timeout* all containing video activity (*motion*) above the picture noise level.

**Black Level Error:** This trap will trigger when a set of consecutive input video frames of length greater than *Black/White Level Error Duration* all contain more pixels below the *Black Error Level* than the

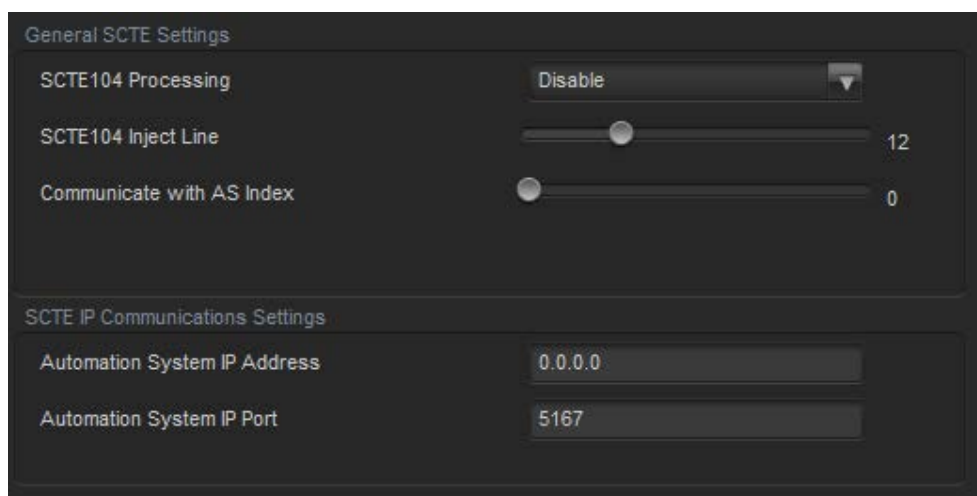
threshold specified by the *Error Quantity* control. This trap will **clear** when a set of consecutive input video frames of length greater than *Black/White Level Error Timeout* all containing less pixels below the *Black Error Level* than the threshold specified by the *Error Quantity* control.

**White Level Error:** This trap will trigger when a set of consecutive input video frames of length greater than *Black/White Level Error Duration* all contain more pixels above the *White Error Level* than the threshold specified by the *Error Quantity* control. This trap will **clear** when a set of consecutive input video frames of length greater than *Black/White Level Error Timeout* all containing less pixels above the *White Error Level* than the threshold specified by the *Error Quantity* control.

**Black Level Warning:** This trap will trigger when a set of consecutive input video frames of length greater than *Black/White Level Warning Duration* all contain less pixels below the *Black Warning Level* than the threshold specified by the *Error Quantity* control. This trap will **clear** when a set of consecutive input video frames of length greater than *Black/White Level Warning Timeout* all containing more pixels below the *Black Warning Level* than the threshold specified by the *Error Quantity* control.

**White Level Warning:** This trap will trigger when a set of consecutive input video frames of length greater than *Black/White Level Warning Duration* all contain less pixels above the *White Warning Level* than the threshold specified by the *Error Quantity* control. This trap will **clear** when a set of consecutive input video frames of length greater than *Black/White Level Warning Timeout* all containing more pixels above the *White Warning Level* than the threshold specified by the *Error Quantity* control.

### 5.2.3. SCTE 104 Control (+SCTE104 Option Only)



**Figure 5-12 : Video Path Configuration – SCTE104 Control**

#### General SCTE Settings

**SCTE104 Processing:** The SCTE104 Processing control allows the user to set the SCTE104 processing functionality of the card. For any subsequent control to operate, this parameter must be set to enable. The values for this control are as follows:

<b>Off</b>	All SCTE 104 functions are disabled.
<b>On</b>	All SCTE 104 functions are enabled.

**SCTE104 Inject Line:** This control allows the user to set the video line. The injectors to inset SCTE 104 data for the outband video. The range for this control is from 6 to 29. The typical line for SCTE 104 data is line 13 but is fully configurable to any desired line in the vertical blanking region of the video signal.

**Communicate with AS Index:** This control allows the user to set a unique automation system for the card to communicate with. The default setting is an index of 0.

### **SCTE IP Communication Settings**

**Automation System IP Address:** This control allows the user to set the IP address for the automation system that will be sending SCTE 104 messages to the card or receiving SCTE 104 messages from the card. The value entered should follow the format, XXX.XXX.XXX.XXX (e.g. 192.168.100.10).

**Automation System IP Port:** This control allows the user to set the port that will be used to connect to the automation system. Up to 10 connections can be made to the card at one time.

#### **5.2.4. SCTE104 Status (+SCTE104 Option Only)**

AS IP Connection

Disconnected

AS IP Activity

Idle

Last AS Message

☒ Received
 ☐ Transmitted

Single Operation Message Received

opID	N/A	AS_index	N/A
message_size	N/A	message_number	N/A
result	N/A	DPI_PID_index	N/A
result_extension	N/A	injector response	N/A
protocol_version	N/A		

Multiple Operation Header Received

Reserved	N/A
message_size	N/A
protocol_version	N/A
AS_index	N/A
message_number	N/A
DPI_PID_index	N/A
SCTE35_protocol_version	N/A
num_ops	N/A

Time Type

time_type	N/A				
UTC	VITC	GPI			
seconds	N/A	hours	N/A	number	N/A
u-seconds	N/A	minutes	N/A	edge	N/A
		seconds	N/A		
		frames	N/A		

Splice Request Data Received

opID	N/A	splice_event_number	N/A	avail_num	N/A
data_length	N/A	unique_program_id	N/A	avails_expected	N/A
splice_insert_type	N/A	pre_roll_time (ms)	N/A	auto_return_flag	N/A
splice_event_source	N/A	break_duration (tenths)	N/A		

**Figure 5-13 : Video Path Configuration – SCTE104 Status**

**SCTE104 Quick Status Monitor**

This section allows the user to monitor the health of the communications between 7815VPDA and the automation system.

**AS IP Connection:** This parameter reports if a valid connection to the automation system is present. The status will display either *disconnected* or *connected*.

**AS IP Activity:** This parameter reports if activity is detected between the card and the automation system. The status will show one of the following values: *Idle*, *Receiving* or *Transmitting*.

The remaining sections allow the user to monitor the SCTE 104 messages received by the 7815VPDA from the automation system or transmitted by the 7815VPDA to the automation system. The user can select between the two modes using the radial buttons beside the control labelled *Last AS Message*.

### 5.2.5. Reference

The 7815VPDA series supports fully independent timing on each video processing path. Each video processing path can be configured to either lock to the input video timing, or the external reference signal timing. The *Reference* tab within the video configuration provides the controls and status related to video path specific reference controls. Figure 5-14 illustrates the layout of the controls in the VistaLINK<sup>®</sup> PRO configuration view.

The screenshot shows a configuration window with two main sections: 'Reference Control' and 'Reference Monitor'.  
Under 'Reference Control', there is a 'Reference Select' dropdown menu currently set to 'External Genlock'.  
Under 'Reference Monitor', there are three status fields: 'Reference Status' (None), 'Reference Type' (None), and 'Genlock Standard' (625V50).  
At the bottom, there are two status indicators: 'Reference Valid Trap Enable' with a checked checkbox and 'Genlock Valid' text, and 'Reference Valid Trap Status' with a red square icon and 'Genlock Valid' text.

**Figure 5-14 : Video Path Configuration - Card Reference**

**Reference Select:** This control selects the source of timing for the video processing path. When set to *External Genlock*, the video path will lock to the reference signal when it is present and valid for the detected input video standard. If the reference signal is not present, the module will lock to an internal free-running clock. When set to *Video*, the video path will generate its timing from the detected input video signal.

#### **Reference Monitor**

**Reference Status:** The *Reference Status* reports the current source of reference for the video path. If the video path is currently locked to a reference signal, it will report the source of the reference signal as *Card ref*, *Frame ref 1*, or *Frame ref 2*. If the card is actively locked to input video, it will report *Video*. If the video path is currently free-running, it will report *None*.

**Reference Type:** The *Reference Type* reports the type of reference for the video path. If the video path is currently locked to a reference signal, it will report the type of the reference signal as either *Bi-phase* or *Tri-level*. If the card is actively locked to input video, it will report *Video*. If the video path is currently free-running, it will report *None*.

**Genlock Standard:** *External Genlock Standard* reports the video standard of the detected reference signal. If a signal has been detected, but the module determines the video standard, it will report *Unknown*. If no reference signal is present on the selected reference input, it will report *Not present*.

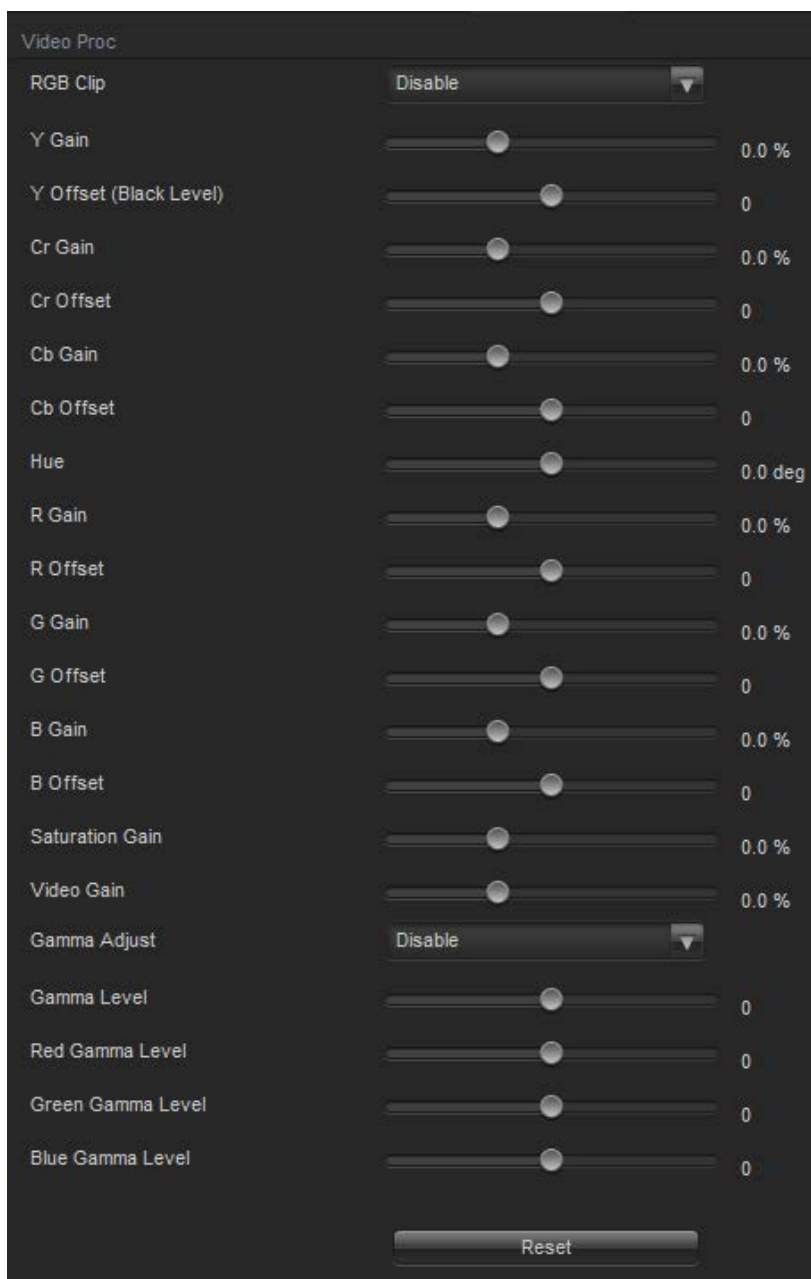
#### **Reference Traps**

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

**Genlock Valid:** This trap will trigger to report an invalid Genlock/reference signal. A reference signal is considered *invalid* if it is not present, unsupported by the module or has a frame rate mismatch with the detected input video standard on the corresponding video path.

### 5.2.6. Video Proc

The Video Proc tab contains controls related to active picture video signal adjustment (gain / offset / hue / gamma). Figure 5-15 illustrates the layout of the controls in the VistaLINK® PRO configuration view.



**Figure 5-15 : Video Path Configuration - Video Proc**



**NOTE:** All Video Proc controls affect the video in real time. H&V frequency bands will cause hits to the video while a new filter is loaded.

## Video Proc

**RGB Clip:** The **RGB Clip** parameter controls RGB clipping/colour legalization process. When set to *enable*, the module will clip any illegal levels of R, G, and B (individually) to their respective Black and White Levels. If disabled, then the illegal values are passed unmodified. This control is normally set to *Disable* in order to allow for Super Black or other test patterns to pass through the module.

**Gain Levels:** There are eight controls that set the gain of the video. With these controls, the user can adjust the gain of the 3 components in either the Y Cr Cb domain or the R G B domain over a range of 50% to 100% in 0.1% steps. Gain adjustments in the YCbCr domain are made first, followed by gain adjustments in the RGB domain. Illegal values are clipped after gain adjustments.

<b>Y Gain:</b>	Ranges from -50% to 100% in 0.1% increments.
<b>Cb Gain:</b>	Ranges from -50% to 100% in 0.1% increments.
<b>Cr Gain:</b>	Ranges from -50% to 100% in 0.1% increments.
<b>R Gain:</b>	Ranges from -50% to 100% in 0.1% increments.
<b>G Gain:</b>	Ranges from -50% to 100% in 0.1% increments.
<b>B Gain:</b>	Ranges from -50% to 100% in 0.1% increments.
<b>Saturation Gain:</b>	Ranges from -50% to 100% in 0.1% increments.
<b>Video Gain:</b>	Ranges from -50% to 100% in 0.1% increments.

**DC Offsets:** There are six controls that set the DC Offset of the video signal. With these controls, the user can individually adjust the DC offset of Y, Cr and Cb with a range of +/- 200 quantization levels and individually adjust the DC offset of R, G and B with a range of +/- 200 quantization levels. Offset adjustments in the YCbCr domain are made first, followed by offset adjustments in the RGB domain. Illegal values are clipped after offset adjustments.

<b>Y Offset:</b>	Ranges from -200 to 200 quantization levels in 1 level increments.
<b>Cb Offset:</b>	Ranges from -200 to 200 quantization levels in 1 level increments.
<b>Cr Offset:</b>	Ranges from -200 to 200 quantization levels in 1 level increments.
<b>R Offset:</b>	Ranges from -200 to 200 quantization levels in 1 level increments.
<b>G Offset:</b>	Ranges from -200 to 200 quantization levels in 1 level increments.
<b>B Offset:</b>	Ranges from -200 to 200 quantization levels in 1 level increments.

**Hue:** With this control, the user can adjust the Hue of the video signal. The hue adjustment range is from -180 to 180 degrees in 0.1 degree increments.

**Gamma Adjust:** The *Gamma Adjust* control enables and disables the gamma adjustment functionality of 7815 series modules. When enabled, the module will allow the user to adjust the gamma level. If disabled, then the gamma levels are set to 0.

**Gamma Level:** With this control, the user can adjust the overall Gamma correction factor from -128 to +127 in increments of 1.

**Red, Green, Blue Gamma Levels:** With these controls, the user can individually adjust the Red, Green, and Blue Gamma levels from -128 to +127 in increments of 1.

**Reset Button:** By pressing the *Reset* button, all Video Processing parameters in the Video Proc control tab will return to their default value.



### 5.2.7. Image Enhancement

The Image Enhancement tab contains controls related to active picture image enhancement adjustments. Image enhancement provides the ability to enhance/sharpen the content within the active picture by applying video processing filters. The image enhancement controls allow the user to tweak the image enhancement algorithm to their perceived acceptable level. Figure 5-16 illustrates the layout of the controls in the VistaLINK® PRO configuration view.



Figure 5-16: Video Path Configuration - Image Enhancement

#### Image Enhancement

**Image Enhancement Enable:** Setting this control to *Enable* will enable the Image Enhancement video processing. Otherwise, when set to *Disable* no image enhancement will be applied.

**Detail Gain:** This control selects the amount of detail gain to be applied to the active picture. The range is from 0 to 127, where 0 refers to no increase in detail gain, and 127 refers to maximum increase in detail gain. Typical operating range for this control is from 0 to 50. Higher values (beyond 50) will normally distort the image beyond the range that is normally considered acceptable.

**Enhancement Limit:** This control selects the largest detail value to be added back into the signal. The range is from 0 to 63. Any enhancement detail that has a value larger than this value will be clipped.

**Horizontal Band:** This control selects the Horizontal frequency band to be enhanced. The horizontal band is adjusted in increments of 5, where 0 selects the lowest frequency band available and 20 the highest.

**Vertical Intensity:** This control selects the intensity of the vertical enhancement process as a ratio of the Horizontal enhancement. The range is from 0% to 100% in increments of 25%, where 0% refers to no vertical enhancement and 100% provides a vertical enhancement that is equivalent to the applied horizontal enhancement.

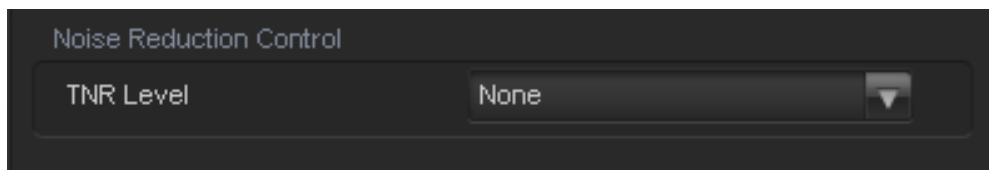
**Luma Floor:** This control selects the minimum luma value that will be enhanced. The range is 0 to 15. Pixels with a luma value below this floor will not be enhanced.

**Detail Noise Floor:** This control specifies the level of image detail below which it is considered to be mostly consisting of noise. As such, the pixel associated with that detail level would not be enhanced. The range is from 0 to 15.

**Reset Button:** By pressing the *Reset* button, all parameters in the *Image Enhancement* tab will return to their default value.

### 5.2.8. Noise Reduction [+UDX2]

The *Noise Control* tab contains configuration parameters related to video noise reduction processing. The 7815VPDA supports temporal noise reduction (TNR) processing. TNR can be applied to the input video signal to detect and remove noise present in the signal. This process is advantageous when performing up scaling to avoid amplifying noise when scaling to a larger output active picture. Figure 5-17 illustrates the layout of the controls in the VistaLINK<sup>®</sup> PRO configuration view. This feature is only valid for the [+UDX2] product option.



**Figure 5-17: Video Path Configuration - Noise Control**

**TNR Level:** This control sets the strength of the applied *Temporal Noise Reduction* filter. The supported values are None, Low, Medium and High. When set to *None*, the TNR processing is not applied.



**NOTE:** Applying strong TNR processing can cause over softening of the active picture in areas of low amplitude with fine details.

### 5.2.9. Deinterlacer [+UDX2]

The Deinterlacer tab contains controls related to active picture deinterlacing. Deinterlacing is a functional part of the video conversion process that converts interlaced field content into progressive frames. The deinterlacer generates the missing lines that were removed during field capture. It performs interpolation in both the spatial and temporal directions to achieve the optimal estimation of the missing pixels from the original captured video frame. The deinterlacer also utilizes a cadence detection algorithm for detecting well known cadences that may be present in the interlaced input signal. If a valid cadence is detected, the original progressive video frame can be extracted from the interlaced input. This results in a perfectly interpolated video signal when producing the progressive output frame.

It is recommended that all interlaced inputs are deinterlaced. This ensures the highest quality scaling when performing video conversion. Figure 5-18 illustrates the layout of the controls in the VistaLINK® PRO configuration view. This feature is only valid for the [+UDX2] product option.

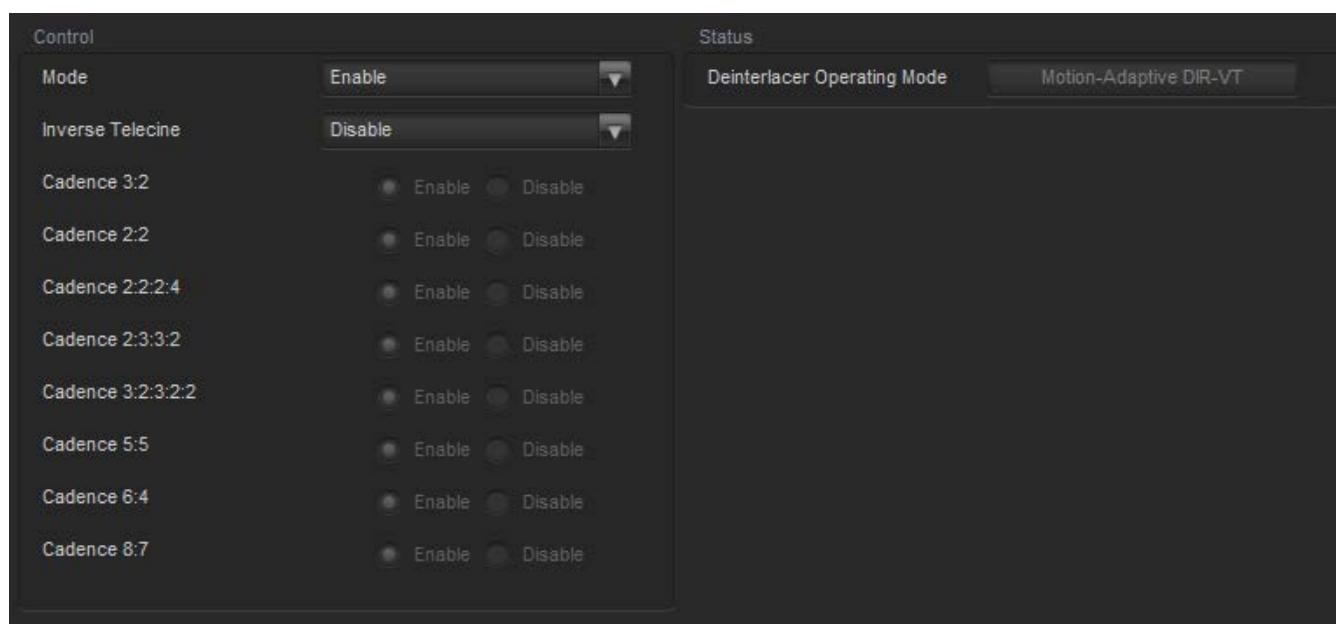


Figure 5-18 : Video Path Configuration - DeInterlacer Control

### Deinterlacer Control

**Mode:** This control sets the operating mode of the deinterlacer. When set to *Enable* all interlaced input signals will be deinterlaced to produce an interpolated progressive signal as the input to the scaler. When set to *Disable* the deinterlacer will be bypassed, and all interlaced input signals will be routed directly to the scaler input.



**NOTE:** Performing scaling operations on an interlaced image will result in lower quality output video in comparison to an image that has been deinterlaced. It is recommended that the deinterlacer be used for all interlaced video inputs prior to performing scaling or aspect ratio conversion.



**NOTE:** The deinterlacer cannot be bypassed for SD input signals (525i/59.94Hz and 625i/50Hz). Regardless of the *Mode* setting, the signal will be processed by the deinterlacer.

**Inverse Telecine:** This control specifies the types of cadences that should be detected and used to perform inverse telecine interpolation on the interlaced input to produce the original progressive frame. When set to *Disable*, the deinterlacer will not apply inverse telecine interpolation. When set to *Enable All*, the deinterlacer will detect all supported cadences, and apply inverse telecine interpolation when a valid cadence is detected. When *Enable* is selected, only the selected cadences (based on the *Individual Cadence Enables*) will be detected and used to perform inverse telecine interpolation.



**NOTE:** It is recommended to use either *Disable* or *Enable Selected* only for the cadences that are known to be present in the input video content. Since the cadence detection algorithm must make a best guess based on active picture content, it is possible for it to incorrectly detect cadence. Incorrect cadence detection can result in sub-optimal deinterlacing.

**Individual Cadence Enables:** When the *Inverse Telecine* control is set to *Enable*, these controls specify which cadences will be detected and used by the deinterlacer to perform inverse telecine interpolation.

### **Deinterlacer Status**

**Deinterlacer Operating Mode:** This status parameter reports the current operating mode of the deinterlacer. When the deinterlacer is bypassed, it reports *Bypass*. When the deinterlacer is processing the input signal, it reports *Motion-Adaptive DIR-VT* to signify motion adaptive spatial / temporal deinterlacing.

### 5.2.10. AFD [+UDX2]

The 7815VPDA series with the [+UDX2] product option supports full-featured AFD processing. Frame accurate, glitch-free aspect ratio conversions are driven based on the AFD data present on the input video signal. For each valid input AFD code, the user can configure the desired aspect ratio conversion to be performed on the input video signal, as well as specifying the AFD data to be embedded on the output signal (*if desired*). Additionally, a default aspect ratio conversion and output AFD code can be specified when no AFD code is detected on the input video signal. The flexible design gives the user the ability to define aspect ratio conversion for all possible scenarios on the input signal.

There are three main control tabs that encompass the full featured AFD functionality. These are the AFD Control, AFD Monitor, and the AFD ARC control tabs. Figure 5-19 illustrates the layout of the AFD control tab in the VistaLINK® PRO configuration view. This feature is only valid for the [+UDX2] product option.

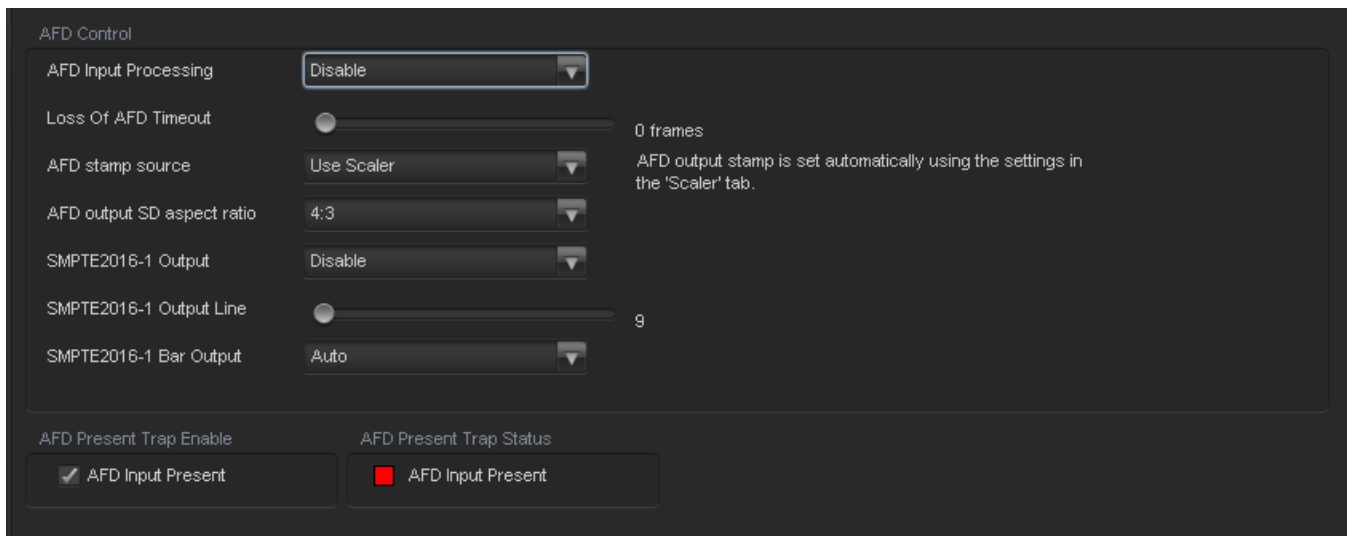


Figure 5-19 : Video Path Configuration - AFD Control

### AFD Control

**AFD Input Processing:** This control enables or disables the AFD input processing. When *Enabled*, the module will decode incoming AFD code ANC packets, and use the input AFD code to drive the aspect ratio conversion processing and AFD code embedding on the output video signal. When *Disabled*, the module will not use the incoming AFD code to drive the aspect ratio conversion processing.



**NOTE:** When AFD input processing is *Disabled*, of the aspect ratio conversion processing will be driven by the user configuration specified on the Scaler tab.

**Loss of AFD Timeout:** This control defines how the module will behave during a loss of the incoming AFD ANC packet. When incoming AFD signals is not present, the module can either revert to a default aspect ratio conversion or continue to apply the aspect ratio conversion defined by the last valid AFD code received on the input signal.

The value set for the *Loss of AFD Timeout* specifies how quickly the module will transition from the last valid AFD code aspect ratio conversion to the default aspect ratio conversion.

When set to *Infinite*, the last valid AFD code will be used to drive the aspect ratio conversion upon loss of AFD code on the input signal.

When set to a number of frames in the range of 0 to 300, the last valid AFD code will be used to drive the aspect ratio conversion upon loss of AFD code on the input signal until the number of frames has elapsed. Once the specified consecutive number of frames has been received without an AFD code present, the default aspect ratio conversion (as defined in the *Scaler* tab) will be applied.

**AFD Stamp Source:** This control enables the user to set the source of the output AFD code. When set to *Use Scaler*, the appropriate AFD code will be automatically generated based on the aspect ratio conversion configuration. When set to *User AFD Stamp*, the output AFD code will be set based on the user specified value on either the *Scaler* tab (for default ARC) or *AFD ARC* tab (for input AFD driven ARC).

**AFD Output SD Aspect Ratio:** This control sets whether SD outputs should be stamped with an AFD code that indicates a 16:9 or 4:3 output image raster.

**SMPTE 2016-1 Output:** This control enables or disables the insertion of AFD ANC data packets on the output video signal.

**SMPTE 2016-1 Output Line:** This control defines the line on which AFD ANC data packets will be inserted into the output video signal when *SMPTE 2016-1 Output* is set to *Enable*. The valid range is from 7 to 24.

**SMPTE2016-1 Bar Output:** This control enables or disables AFD Bar Data in the output AFD ANC packet. Bar data is used within the AFD packet in order to indicate the exact image size when it is not exactly 16:9 or 4:3. When set to *Auto*, the module will automatically embed AFD Bar Data if necessary based on the current aspect ratio conversion being performed on the output video signal. When set to *Enable*, AFD Bar Data will always be included in the output AFD ANC packet. When set to *Disable*, AFD Bar Data will not be included in the output AFD ANC packet.

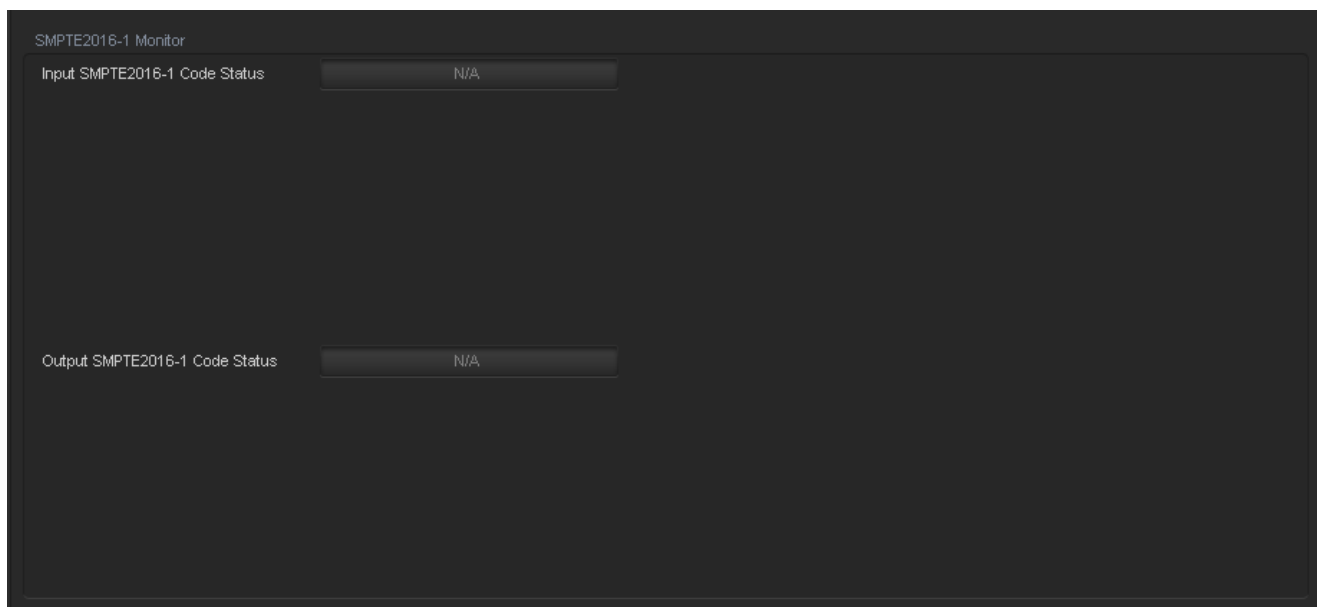
### **AFD Input Present Trap**

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

**AFD Input Present:** This trap will trigger to report loss of the AFD ANC packet on the input video signal.

### 5.2.11. AFD Monitor [+UDX2]

The AFD monitoring tab is used to report the detected input AFD code and the corresponding output AFD code embedded on the output video signal. Figure 5-20 illustrates the layout of the AFD monitoring status in the VistaLINK® PRO configuration view. The AFD monitoring feature is only valid for the [+UDX2] product option.



**Figure 5-20 : Video Path Configuration - AFD Monitor**

**Input SMPTE2016-1 Code Status:** This reports the AFD code detected on the input signal. The AFD code is described both textually and graphically. When no AFD code is detected on the input signal, the status reports *N/A*.

**Output SMPTE2016-1 Code Status:** This reports the AFD code that is actively embedded on the output video signal according to the specified AFD user configuration. When *SMPTE 2016-1 Output* is set to *Disable*, the status reports *N/A*.

### 5.2.12. SD Aperture [+UDX2]

The precise definition of *active picture region* for an SD video standard is often unclear. This is due to the fact that SD signals have been defined differently in various standards. To support varying active picture regions for SD video standards, the 7815VPDA module allows the user to fully define both the production and clean aperture regions using the SD aperture feature. The SD Aperture feature allows the user to set the exact number of pixels and exact number of lines that are used to define the *SD Clean Aperture* and the *SD Production Aperture*. Both the *Clean Aperture* and the *Production Aperture* are independently definable. The user must also define whether to use the *Clean Aperture* or the *Production Aperture* to determine the pixel aspect ratio (PAR) for aspect ratio conversion calculations. Figure 5-21 illustrates the layout of the *SD Aperture* control tab in the VistaLINK<sup>®</sup> PRO configuration view. The *SD Aperture* feature is only valid for the [+UDX2] product option.

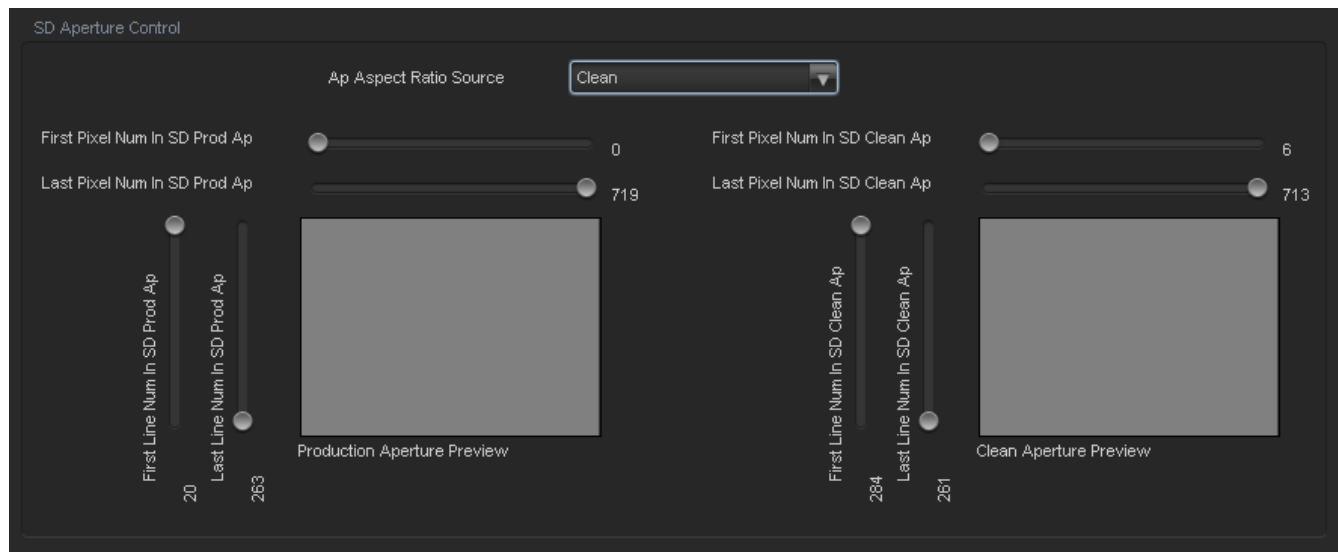


Figure 5-21 : Video Path Configuration - SD Aperture

#### SD Aperture Control

**Ap Aspect Ratio Source:** The *Active Picture (AP) Aspect Ratio Source* control selects whether the *Production Aperture* or the *Clean Aperture* is used when calculating the pixel aspect ratio (PAR) for aspect ratio conversion calculations.

**Ap Aspect Ratio Settings:** These controls allow the user to define the exact number of pixels and exact number of lines that are used to define the *SD Clean Aperture* and the *SD Production Aperture*. A graphic is present in the SD aperture control tab to illustrate the defined active picture region (See Figure 5-21).



### 5.2.13. User ARC [+UDX2]

The *User ARC* section allows the user to create custom aspect ratio conversions (ARC) that can be used in either the default aspect ratio conversion (*Scaler tab*), or input AFD code driven aspect ratio conversions (*AFD ARC tab*). The user can also designate a *name* for each custom ARC that will be displayed in all *Aspect Ratio Conversion* drop down menus. The User ARC supports up to 10 user defined custom aspect ratio conversions (per video path). Figure 5-22 illustrates the layout of the *User ARC* control tab in the VistaLINK® PRO configuration view. The *User ARC* feature is only valid for the [+UDX2] product option.

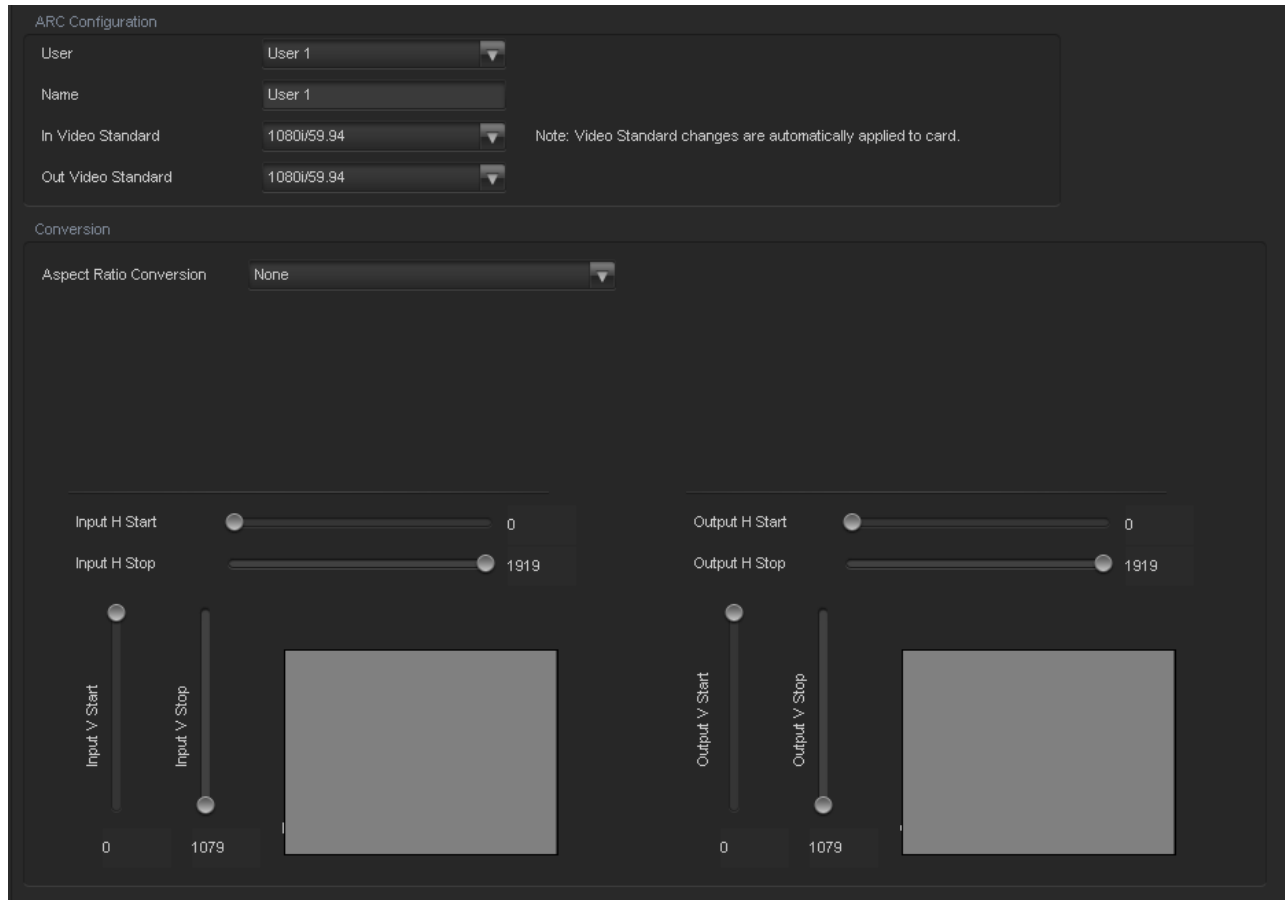


Figure 5-22 : Video Path Configuration - User AFD

#### ARC Configuration

**User Control:** This control selects which user ARC will store the custom ARC configuration. The User ARC supports up to 10 user defined custom aspect ratio conversions (per video path).

**Name Control:** This control can be used to specify a more descriptive name for the custom ARC configuration. The specified name will be listed in the in all *Aspect Ratio Conversion* drop down menus on the module (*Scaler and User ARC tabs*) to easily setup the custom ARC to be applied for aspect ratio conversion processing.

**In Video Standard:** This control sets the input video standard for the custom ARC. The value of this parameter defines the acceptable ranges of the *Input H/V Start/Stop* controls.

**Out Video Standard:** This control sets the output video standard for the custom ARC. The value of this parameter defines the acceptable ranges of the *Output H/V Start/Stop* controls.

## Conversion Controls

**Aspect Ratio Conversion:** This control provides a number of pre-defined aspect ratio conversions (ARCs) that can be used in the custom ARC configuration. This control is useful when the user desires to create a slightly modified ARC with respect to one of the pre-defined ARCs. When a particular ARC is selected, it will automatically calculate and update all 8 parameters that define the ARC (*Input/Output H/V Start/Stop*). After the ARC parameters have been updated, the user can tweak the values as desired to achieve a slightly modified ARC. When *None* is selected, all 8 ARC parameters will remain at their current values. Table 5-3 lists all pre-defined aspect ratio conversions (ARCs) available on the 7815VPDA module.

<b>Full Raster</b>	Converts the full input raster to full output raster. If the input and output aspect ratios are not equivalent, there will be aspect distortion.
4:3 Side Panel to 16:9 TB Cut 13:9 Letter Box to 16:9 TB Cut 14:9 Letter Box to 16:9 TB Cut 13:9 Stretch to 16:9 TB Cut 14:9 Stretch to 16:9 TB Cut 16:9 Stretch to 16:9 TB Cut	These settings convert the input picture to 16:9 top and bottom cuts.
13:9 Stretch to 4:3 Side Panel 14:9 Stretch to 4:3 Side Panel 16:9 Stretch to 4:3 Side Panel	These settings squeeze common stretched input video back to 4:3 side panel images on a 16:9 aspect raster.
4:3 to 4:3 Side Panel on 16:9 4:3 to 13:9 Stretch on 16:9 4:3 to 14:9 Stretch on 16:9 4:3 to 16:9 Stretch on 16:9 4:3 to 13:9 Crop on 16:9 4:3 to 14:9 Crop on 16:9 4:3 to 16:9 Crop on 16:9	These settings are common up converter settings for converting 4:3 aspect ratio images to common 16:9 formats. These settings are not appropriate for cross or down conversion.
16:9 to 16:9 Letter Box on 4:3 16:9 to 14:9 Letter Box on 4:3 16:9 to 13:9 Letter Box on 4:3 16:9 to 4:3 Side Cut on 4:3 16:9 to 4:3 Squeeze on 4:3	These settings are common down converter settings for converting 16:9 aspect ratio images to common 4:3 formats. These settings are not appropriate for cross or up conversion.
16:9 Top Letter Box on 4:3 to 16:9 14:9 Top Letter Box on 4:3 to 16:9 TB Cut 14:9 Top Letter Box on 4:3 to 14:9 Side Panel 14:9 Top Letter Box on 4:3 to 16:9 Stretch on 16:9 16:9 Top Letter Box on 4:3 to 16:9	
14:9 Letter Box on 4:3 to 16:9 TB Cut 14:9 Letterbox on 4:3 to 14:9 Side Panel 14:9 Letterbox on 4:3 to 16:9 Stretch on 16:9	
4:3 Side Panel on 16:9 to 4:3 14:9 Side Panel to 14:9 Letter Box on 4:3 14:9 Side Panel to 4:3 Side Cut on 4:3 14:9 Side Panel to 4:3 Squeeze on 4:3	

**Table 5-3 : User ARC - Aspect Ratio Conversion**

**User Aspect Ratio Setting:** These controls allow the user to completely define the aspect ratio conversion processing. There are a total of 8 parameters that define the ARC: Input H Start, Input H Stop, Input V Start, Input V Stop, Output H Start, Output H Stop, Output V Start, and Output V Stop. The input parameters define the bounding-box within the input active picture region that will be used as the input to the scaler. The output parameters define the bounding-box region within the output raster that will contain the scaler output. Table 5-4 defines the function of the 8 parameters that define the ARC.

<b>Input H Start / Input H Stop:</b>	The <i>Input H Start</i> and <i>Input H Stop</i> define the horizontal portion of the input image to process to the output raster.
<b>Input V Start / Input V Stop:</b>	The <i>Input V Start</i> and <i>Input V Stop</i> define the vertical portion of the input image to process to the output raster.
<b>Output H Start / Output H Stop:</b>	The <i>Output H Start</i> and <i>Output H Stop</i> define how to scale the cropped input image horizontally and where to place it horizontally on the output raster.
<b>Output V Start / Output V Stop:</b>	The <i>Output V Start</i> and <i>Output V Stop</i> define how to scale the cropped input image vertically and where to place it vertically on the output raster.

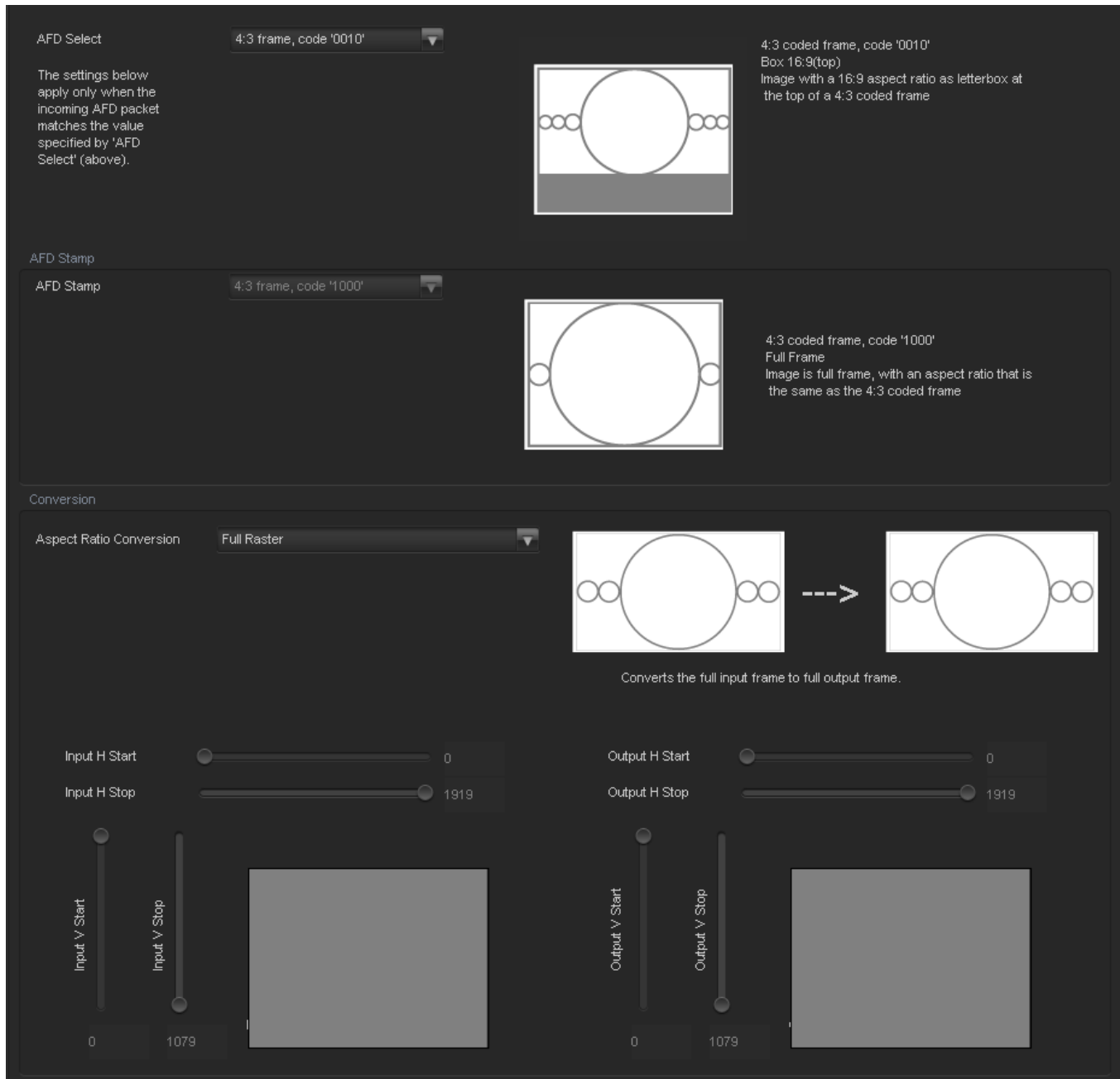
**Table 5-4 : User ARC - User Aspect Ratio Settings**

#### 5.2.14. AFD ARC [+UDX2]

The *AFD ARC* control tab allows the user to define how each input AFD code will drive the aspect ratio conversion (ARC) processing. For each incoming AFD code, the user may specify a unique ARC operating mode and a unique output AFD code. Each user defined ARC is uniquely tied to a particular input AFD code. When *AFD Input Processing* is set to *enable* and a valid input AFD code is detected on the input video, the corresponding ARC configuration will be triggered frame-accurately and glitch-free. Figure 5-23 illustrates the layout of the *AFD ARC* control tab in the VistaLINK® PRO configuration view. The *AFD ARC* feature is only valid for the [+UDX2] product option.



**NOTE:** *AFD input processing* must be set to *Enable* for the settings in the AFD ARC tab to be applied for aspect ratio conversion processing.



**Figure 5-23 : Video Path Configuration - AFD ARC**

**AFD Select:** This control selects the incoming AFD code that will drive the defined ARC. A separate ARC definition exists for each entry in the *AFD Select* drop-down menu. For AFD input processing to function correctly and as desired, the user must define an appropriate ARC for each expected input AFD code. For each entry in the *AFD Select* drop-down menu, a pictorial representation of the actual aspect ratio being selected is shown. The *AFD Select* control consists of all valid AFD codes according to SMPTE 2016-1. Table 5-5 lists all supported input AFD codes.

16:9 frame, code '0010'
16:9 frame, code '0011'
16:9 frame, code '0100'
16:9 frame, code '1000'
16:9 frame, code '1001'
16:9 frame, code '1010'
16:9 frame, code '1011'
16:9 frame, code '1101'
16:9 frame, code '1110'
16:9 frame code '1111'
4:3 frame, code '0010'
4:3 frame, code '0011'
4:3 frame, code '0100'
4:3 frame, code '1000'
4:3 frame, code '1001'
4:3 frame, code '1010'
4:3 frame, code '1011'
4:3 frame code '1101'
4:3 frame code '1110'
4:3 frame code '1111'

Table 5-5 : AFD ARC - All Supported AFD Codes

**AFD Stamp:** This control enables the user to specify the AFD code to be embedded on the output video for the corresponding input AFD code specified by the *AFD Select* control. For each entry in the *AFD Stamp* drop-down menu, a pictorial representation of the actual aspect ratio being selected is shown. The *AFD Stamp* control consists of all valid AFD codes according to SMPTE 2016-1. Table 5-5 lists all supported output AFD codes.



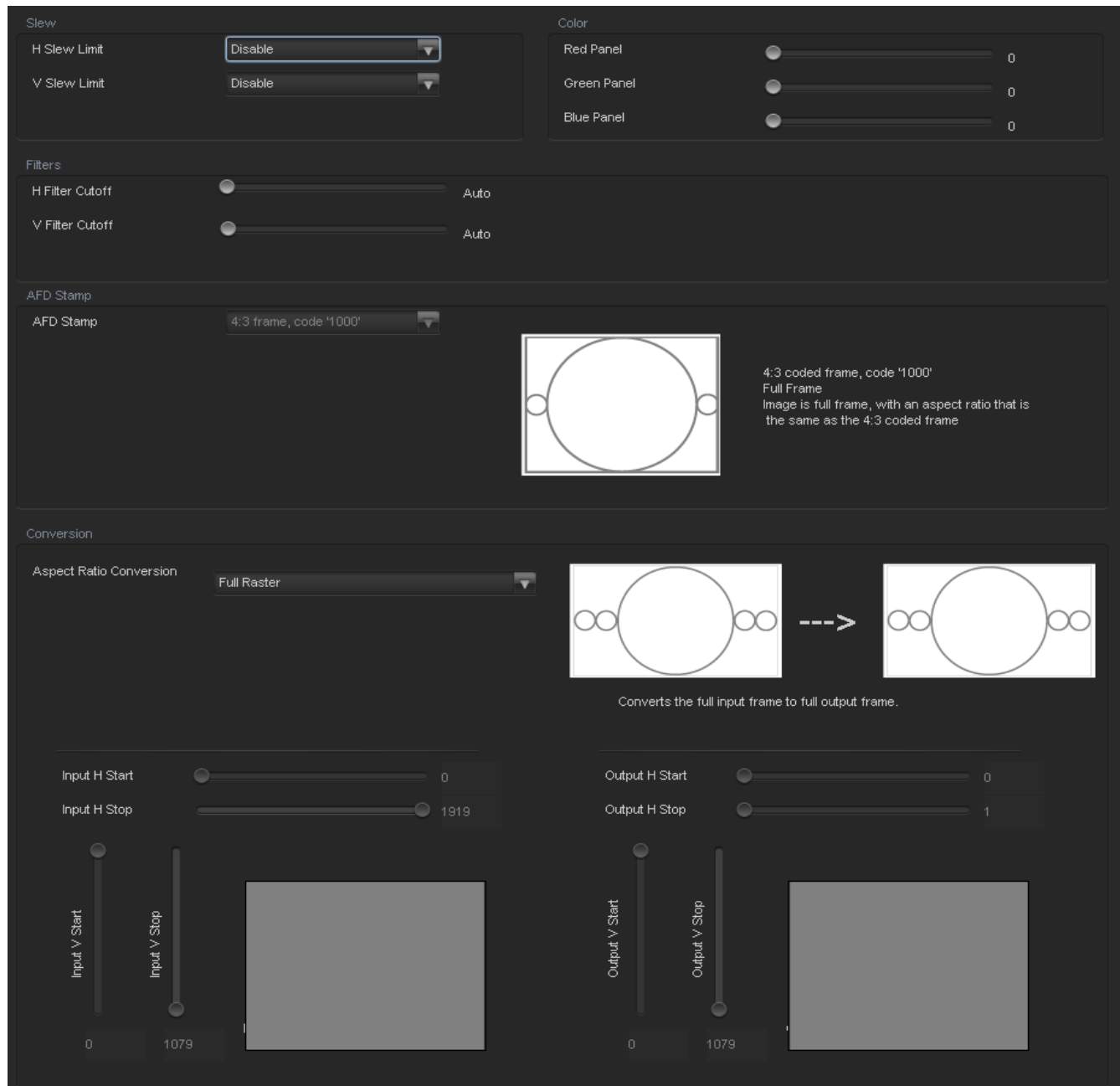
**NOTE:** *AFD Stamp* is only valid when *AFD Stamp Source* is set to *User AFD Stamp*. Otherwise, the *AFD Stamp* control will be disabled, and the module will automatically select the appropriate AFD code.

## Conversion Settings

**Aspect Ratio Conversion:** The *Aspect Ratio Conversion* menu is used to define the ARC processing that will be performed for the corresponding input AFD code specified by the *AFD Select* control. The user can select any of the pre-defined aspect ratio conversions (ARCs) that are commonly used for typical ARC requirements, or the user can select one of the 10 user defined customs ARCs. The user ARCs are defined using the User ARC configuration tab. Table 5-3 lists all pre-defined aspect ratio conversions (ARCs) available on the 7815VPDA module.

### 5.2.15. Scaler [+UDX2]

The 7815VPDA series uses high performance multi-tap polyphase filters to perform scaling and aspect ratio conversion on the input video signal to produce a high quality scaled output video signal. The *Scaler* tab allows the user to configure sharpness of vertical and horizontal edge transitions, cut-off frequencies of the polyphase filters, set the RGB background colour for unused areas in the output raster and to define the default aspect ratio conversion and AFD output code. Figure 5-24 illustrates the layout of the *Scaler* control tab in the VistaLINK® PRO configuration view. The Scaler tab is only valid for the [+UDX2] product option.



**Figure 5-24 : Video Path Configuration - Scaler**

## Slew Settings

**Slew Limits:** There are individual controls for *H Slew Limit* and *V Slew Limit*. When set to *enabled*, these controls process sharp spatial transitions to minimize ringing (*an aliasing artifact of scaling an image*) around such transitions. When *disabled*, the edge processing is disabled. *H Slew Limit* applies processing to sharp horizontal edges, while *V Slew Limit* applies processing to sharp vertical edges.

## Colour Controls

**Panel Colours:** Red (R), Green (G), and Blue (B) panel controls set the background colour (in RGB colour space) of the scaler output that fills any used region of the output raster. In typical aspect ratio conversions, this is either the top and bottom of the raster (for Letterbox ARCs), or the left and right side of the output raster (for Side panel ARCs). The range for each panel colour control is 0 to 255 (8-bit RGB).

## Filters Settings

There are two user controls that can be used to adjust the scaler filter operations. The *H Filter Cutoff* control defines the horizontal filtering characteristics. The *V Filter Cutoff* control defines the vertical filtering characteristics.

The smaller the selected numerical value, the narrower the corresponding filter bandwidth will be. The narrower the bandwidth, the less aliasing is passed through to the output at a cost of a loss of image sharpness. The larger the value, the wider the corresponding filter bandwidth will be. The wider the filter bandwidth, the sharper the output image, at the cost of increased aliasing.

**Filter Cutoff:** This controls the horizontal filter bandwidth. This control has an *auto* mode which selects the optimal filter, several unique filters that have specific enhancement profiles, as well as numerical values which adjust the filter bandwidth. Table 5-6 outlines all supported values of the *H Filter Cutoff*.

<b>Auto</b>	The optimal horizontal filter is automatically selected to match the scaling and aspect ratio conversion process being performed.
<b>Enhance HF 1 dB</b>	High frequencies within the image are enhanced by 1 dB
<b>Enhance HF 2 dB</b>	High frequencies within the image are enhanced by 2 dB
<b>Mid Band Boost 1 dB</b>	Mid band frequencies within the image are enhanced by 1 dB
<b>Mid Band Boost 2 dB</b>	Mid band frequencies within the image are enhanced by 2 dB
<b>Levels 5....64</b>	Selects the horizontal filter bandwidth such that each value 5 thru 64 corresponds to 1/64 <sup>th</sup> the bandwidth of the input signal. The smaller the value, the narrower the filter bandwidth.

**Table 5-6 : Scaler - H Filter Cutoff**

**V Filter Cutoff:** This controls the vertical filter bandwidth. This control has an *auto* mode which selects the optimal filter, as well as numerical values which adjust the filter bandwidth. Table 5-7 outlines all supported values of the *V Filter Cutoff*.

<b>Auto</b>	The optimal vertical filter is automatically selected to match the scaling and aspect ratio conversion process being performed.
<b>Levels 1....64</b>	Selects the vertical filter bandwidth such that each value 1 thru 64 corresponds to 1/64 <sup>th</sup> the bandwidth of the input signal.

**Table 5-7 : Scaler - V Filter Cutoff**

**AFD Stamp:** This control enables the user to specify the AFD code to be embedded on the output video for the default ARC processing that will be applied when *AFD Input Processing* is set to *disable*, or when no AFD code is present on the input signal and *Loss of AFD Timeout* has expired. For each entry in the *AFD Stamp* drop-down menu, a pictorial representation of the actual aspect ratio being selected is shown. The *AFD Stamp* control consists of all valid AFD codes according to SMPTE 2016-1. Table 5-5 lists all supported output AFD codes.



**NOTE:** *AFD Stamp* is only valid when *AFD Stamp Source* is set to *User AFD Stamp*. Otherwise, the *AFD Stamp* control will be disabled, and the module will automatically select the appropriate AFD code.

### **Conversion Settings**

**Aspect Ratio Conversion:** The *Aspect Ratio Conversion* menu is used to define the default ARC processing that will be applied when *AFD Input Processing* is set to *disable*, or when no AFD code is present on the input signal and *Loss of AFD Timeout* has expired. The user can select any of the pre-defined aspect ratio conversions (ARCs) that are commonly used for typical ARC requirements, or the user can select one of the 10 user defined customs ARCs. The user ARCs are defined using the User ARC configuration tab (Refer to Section 5.2.13 for further details). Table 5-3 lists all pre-defined aspect ratio conversions (ARCs) available on the 7815VPDA module.



### 5.2.16. Video Encoder [+SLKE2]

The *Video Encoder* control tab allows the user to fully configure the IP streaming H.264/MPEG-2 video encoder. The fully processed SDI output signal sources the video encoder. The video encoder is also capable of performing video standard conversion if it is desirable for the encoded IP stream to be a lower video resolution than the SDI outputs. The packetized video encoded IP stream can be setup with either a unicast or multicast destination IP address. The IP stream is output on the DATA port of the 7815VPDA rear-plate (Refer to Figure 2-1). Figure 5-25 illustrates the layout of the *Video Encoder* control tab in the VistaLINK® PRO configuration view. The *Video Encoder* feature is only valid for the [+SLKE2] product option.



**NOTE:** The video standard conversion processing of the video encoder is lower quality than the SDI video standard conversion processing path. It is recommended to only perform video standard conversion processing on the video encoder if a lower encoded video resolution is desired.



**NOTE:** The total video bitrate of both video paths combined should not exceed 30 Mbps.

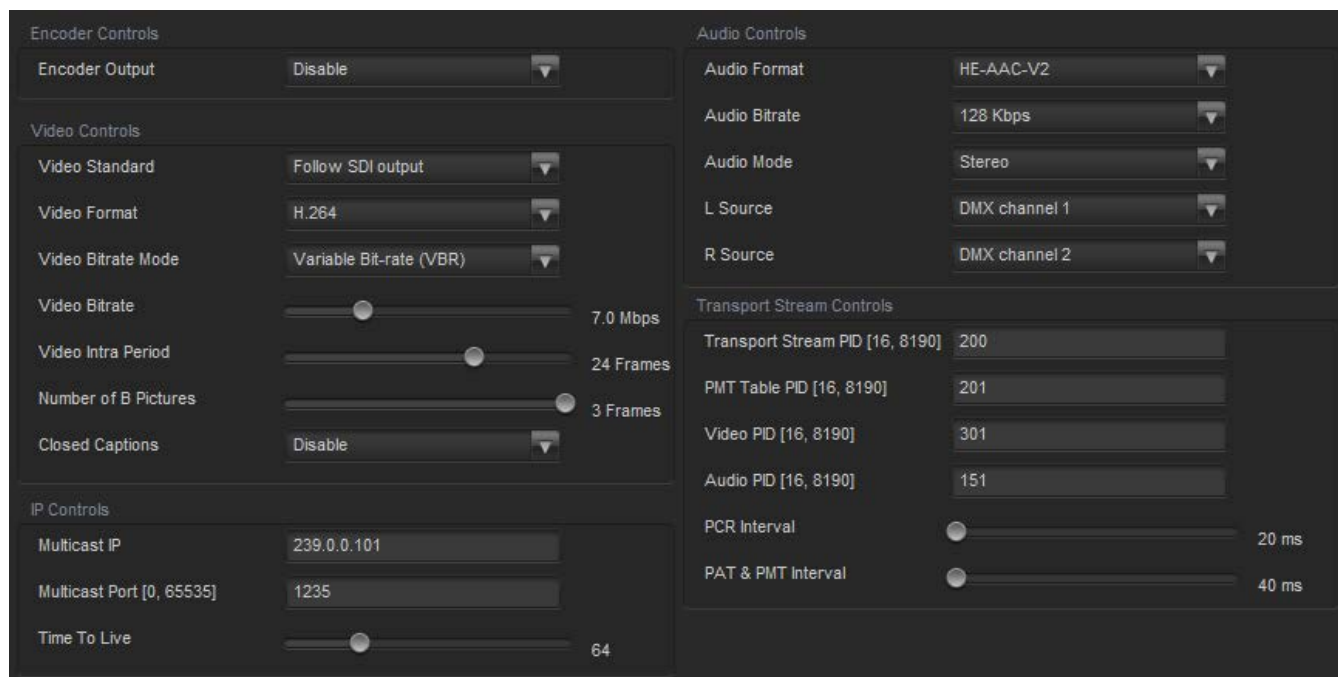


Figure 5-25 : Video Path Configuration - Video Encoder

### Encoder Controls

**Encoder Output:** This control is used to enable or disable the video encoding for the corresponding video path.

## Video Controls

**Video Standard:** This control selects the encoder output video standard. When set to *Follow SDI output*, the video encoder output standard will match the SDI output video standard. This is the desired mode of operation for optimal video encoding quality. If it is desired to configure the encoder output standard differently than the SDI output video standard, Table 5-8 lists all supported video conversions. *Encoder Input Video Standards* listed in the first column can be converted to any *Encoder Output Video Standard* in the second column within the same row of the table below.

Encoder Input Video Standards (same as SDI Output Video Standards)	Encoder Output Video Standards
525i/59.94Hz 720p/59.94Hz 1080i/59.94Hz 1080p/59.94Hz (425M level A) [-3G option only] 1080p/59.94Hz (425M level B) [-3G option only]	240p/59.94Hz 480i/59.94Hz 480p/59.94Hz 720p/59.94Hz 1080i/59.94Hz 1080p/59.94Hz
625i/50Hz 720p/50Hz 1080i/50Hz 1080p/50Hz (425M level A) [-3G option only] 1080p/50Hz (425M level B) [-3G option only]	240p/50Hz 576i/50Hz 576p/50Hz 720p/50Hz 1080i/50Hz 1080p/50Hz

**Table 5-8 : Video Encoder - Supported Video Conversions**

**Video Format:** This control sets the video encoding format. The video encoder is capable of encoding using either H.264 or MPEG-2 video compression formats.



**NOTE:** 1080p video encoding is only supported using H.264 video compression.

**Video Bitrate Mode:** This control sets the bit rate mode of the video encoder output stream. *Constant Bitrate (CBR)* maintains the specified bit rate by inserting NULL packets into the MPEG-2 Transport Stream (TS) when full bandwidth is not required. *Variable Bitrate (VBR)* produces an MPEG-2 TS with a variable bit rate that will average around the bit rate specified by the *Video Bitrate* control.

**Video Bitrate:** This control sets the video encoder output bit rate. This value does not include audio, MPEG-2 TS table structures and IP overhead. The video bit rate range is 0.5 Mbps to 25.0 Mbps.

**Video Intra Period:** This control sets the duration between I-frames in the compressed video output.

**Number of B Pictures:** This control sets the number of consecutive B-pictures between consecutive I-frames or P-frames in the compressed video output.

**Closed Captions:** This control enables/disables the embedding of CEA608 & CEA708 closed captions into the MPEG-2 Transport Stream. The closed caption data that is embedded is extracted from the CDP closed caption ANC packets present on the SDI baseband output.

## IP Controls

**Multicast IP:** Sets the destination of the encoder output IP stream. It can be either a multicast or unicast IP address.

**Port Number:** Sets the destination port number of the encoder output IP stream. The range is 0 to 65535 (16-bits)

**Time to Live:** Sets the lifetime of the encoder output IP stream packets on the network.

## Audio Controls

**Audio Format:** This control sets the desired audio encoding format. The supported audio encoding formats include *AAC-LC*, *HE-AAC-V1*, *HE-AAC-V2*, and *MPEG-1 Layer 2*.

**Audio Bitrate:** This control sets the output bit rate of the audio encoder. The supported audio bit rates vary based on the selected *Audio Format* and *Audio Mode*. Table 5-9 lists all supported audio bit rates for each *Audio Format* and *Audio Mode* combination.

Audio Encoding Format	Supported Audio Bit Rates (Kbps)
AAC-LC	Mono: 64, 96, 128, 192, 256 Stereo: 64, 96, 128, 192, 256, 384
HE-AAC-V1	Mono: 32, 64, 96, 128 Stereo: 32, 64, 96, 128, 256
HE-AAC-V2	Mono: Not supported Stereo: 32, 64, 128
MPEG-1 Layer 2	Mono: 64, 96, 128, 192 Stereo: 64, 96, 128, 192, 256, 384

**Table 5-9 : Video Encoder - Supported Audio Bit Rates**

**Audio Mode:** This control sets the audio encoding mode as either *Mono* (single channel) or *Stereo* (2-channel).



**NOTE:** The HE-AAC-V2 audio encoding format does not support mono (single channel) audio encoding.

**Audio (L/R) Source Selection:** This control sets the audio input sources to the audio encoder. The audio source can be any of the 16 embedded audio channels on the processed SDI output signal (*which sources the video encoder*), as well as the output channels of the video encoder audio downmix processor (*Downmix L* and *Downmix R*).



**NOTE:** When *Audio Mode* is set to *Mono*, the *L Source* control will be routed as the single audio channel input to the audio encoder.

### Transport Stream Controls

**Transport Stream PID:** This control sets the transport stream (PID) in the output MPEG-2 transport stream (TS). This value must be unique, and cannot be the same as any other PID in the same MPEG-2 TS. The valid range is 16 to 8190.

**PMT PID:** This control sets the program map table packet identifier (PID) in the output MPEG-2 TS. This value must be unique, and cannot be the same as any other PID in the same MPEG-2 TS. The valid range is 16 to 8190.

**Video PID:** This control sets the video packet identifier (PID) in the output MPEG-2 TS. This value must be unique, and cannot be the same as any other PID in the same MPEG-2 TS. The valid range is 16 to 8190.

**Audio PID:** This control sets the audio packet identifier (PID) in the output MPEG-2 TS. This value must be unique, and cannot be the same as any other PID in the same MPEG-2 TS. The valid range is 16 to 8190.

**PCR Interval:** This control sets the PCR (Program Clock Reference) interval that specifies the frequency of PCR packets in the output MPEG-2 TS. The valid range is 20 ms to 100 ms.

**PAT & PMT Interval:** This control sets the PAT (Program Association Table) and PMT (Program Map Table) interval that specifies the frequency of PAT and PMT packets in the output MPEG-2 TS. The valid range is 40 ms to 100 ms.



**NOTE:** Modifying **ANY** video encoding control or the **output video standard** control on either video path will cause **BOTH** video encoded IP streams to restart.

### 5.2.17. Video Encoder Downmix [+SLKE2]

The *Video Encoder* [+SLKE2] product option includes a dedicated audio downmix processor to generate stereo (2 ch) audio from surround sound (5.1 ch). This proves useful when the processed SDI output signal that sources the video encoder only contains 5.1 surround sound. Since the video encoder does not support 5.1 surround sound encoding, the 5.1 surround sound audio should first be processed using the audio downmix processor to produce the optimal stereo (2 ch) sound to be audio encoded. The Figure 5-26 illustrates the layout of the *Video Encoder Downmix* control tab in the VistaLINK® PRO configuration view. The *Video Encoder Downmix* feature is only valid for the [+SLKE2] product option

The Downmix audio processing module provides the ability to downmix 5.1 surround sound to 2-channel (stereo) sound. The Downmix audio processor can be configured to utilize common downmixing algorithms (Lo/Ro, Lt/Rt) and is also fully user configurable.

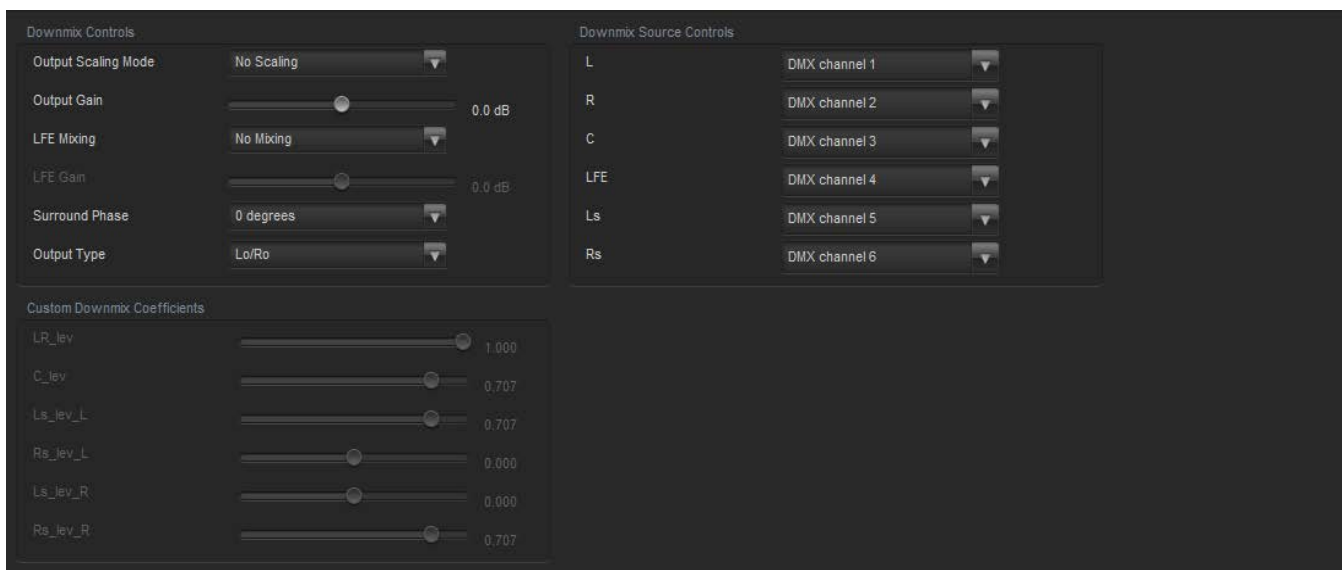


Figure 5-26 : Video Path Configuration - Video Encoder Downmix

**Output Scaling Mode:** This control allows the user to determine whether the down mix matrixing is normalized or not. To normalize matrix coefficients, **Overflow Scaling must be selected**. Normalization of matrix coefficients will avoid any possibility of overflow, but it tends to lower the loudness level when compared against the original 5.1 input. If no normalization is applied, the stereo down-mix usually sounds at the similar levels as the 5.1 audio inputs. But clipping may occur when the input sound level is close to 0dB FS.

**Output Gain:** This control allows the user to configure the output gain of the Downmix audio processing outputs (Downmix L & R). The output gain ranges from -20 dB to +20 dB in 0.1 dB increments.

**LFE Mixing:** This control allows the user to control whether the LFE channel is included or not in the audio down-mixing.

**LFE Gain:** This control allows the user to adjust the gain applied to the LFE channel. This control is in effect only when **LFE Gain** is selected for **LFE Mixing** control. The range for this value can be set from -20.0dB to 20.0dB in 0.1 dB increments.

**Surround Phase:** This control allows the user to choose whether no phase shift (0 degrees) or a 90 degree phase shift is applied to the surround channels before being passed to the down-mix matrix. Select 0 degree if no 90-degree phase shift is needed. It is required that surround channels are 90-degree phase shifted for Dolby Prologic I decoding, but if surround channels in the 5.1 audio input are already 90-degree phase shifted, then the user should select 0 degree to avoid double 90-degree phase shifting. Normally, the 90 degrees phase shift is applied.

**Output Type:** This control allows the user to set the type of audio down-mixing that will be performed. The user may select from LoRo (Left Only and Right Only), LtRt (Left Total and Right Total) Prologic I and LtRt (Left Total and Right Total) Prologic II OR may choose to perform a Custom down-mix.

### **Custom Downmix Coefficients**

When the *Down Mix Type* is set to *Custom* the following equation will be used to generate the down-mixed audio.

$$L = (LR_{lev} \times L + C_{lev} \times C + LS_{levL} \times Ls\{0^\circ / 90^\circ\} + RS_{levL} \times Rs\{0^\circ / 90^\circ\} + lfe_{gain} \times LFE) \times gain \div norm$$

$$R = (LR_{lev} \times R + C_{lev} \times C + LS_{levR} \times Ls\{0^\circ / 90^\circ\} + RS_{levR} \times Rs\{0^\circ / 90^\circ\} + lfe_{gain} \times LFE) \times gain \div norm$$

Where  $lfe_{gain}$  is controlled by LFE Mixing and LFE Gain,  $gain$  is controlled by Output Gain and  $norm$  is controlled by Output Scaling Mode and where  $LR_{lev}$ ,  $C_{lev}$ ,  $LS_{levL}$ ,  $RS_{levL}$ ,  $LS_{levR}$  and  $RS_{levR}$  are custom specified user coefficients. These custom down-mixing coefficients are controlled using the appropriate slider bars in the *Custom Down mix Coefficients* control section in VISTALINK® PRO (see Figure 5-26).

$LR_{lev}$	:	Ranges from 1.000 to –1.000 in increments of 0.001.
$C_{lev}$	:	Ranges from 1.000 to –1.000 in increments of 0.001.
$LS_{levL}$	:	Ranges from 1.000 to –1.000 in increments of 0.001.
$RS_{levL}$	:	Ranges from 1.000 to –1.000 in increments of 0.001.
$LS_{levR}$	:	Ranges from 1.000 to –1.000 in increments of 0.001.
$RS_{levR}$	:	Ranges from 1.000 to –1.000 in increments of 0.001.

**Downmix Source Controls:** These controls set the audio input source for each of the downmix processor input channels ( $L / R / C / LFE / Ls / Rs$ ). The audio input source can be any of the 16 embedded audio channels on the processed SDI output signal (*which sources the video encoder*).

### 5.2.18. Audio

The Audio tab contains controls related to core audio configuration (de-embedding, delay, and re-embedding) as well as basic monitoring information regarding the input audio sourced to the module. Figure 5-27 illustrates the layout of the controls in the VistaLINK® PRO configuration view.

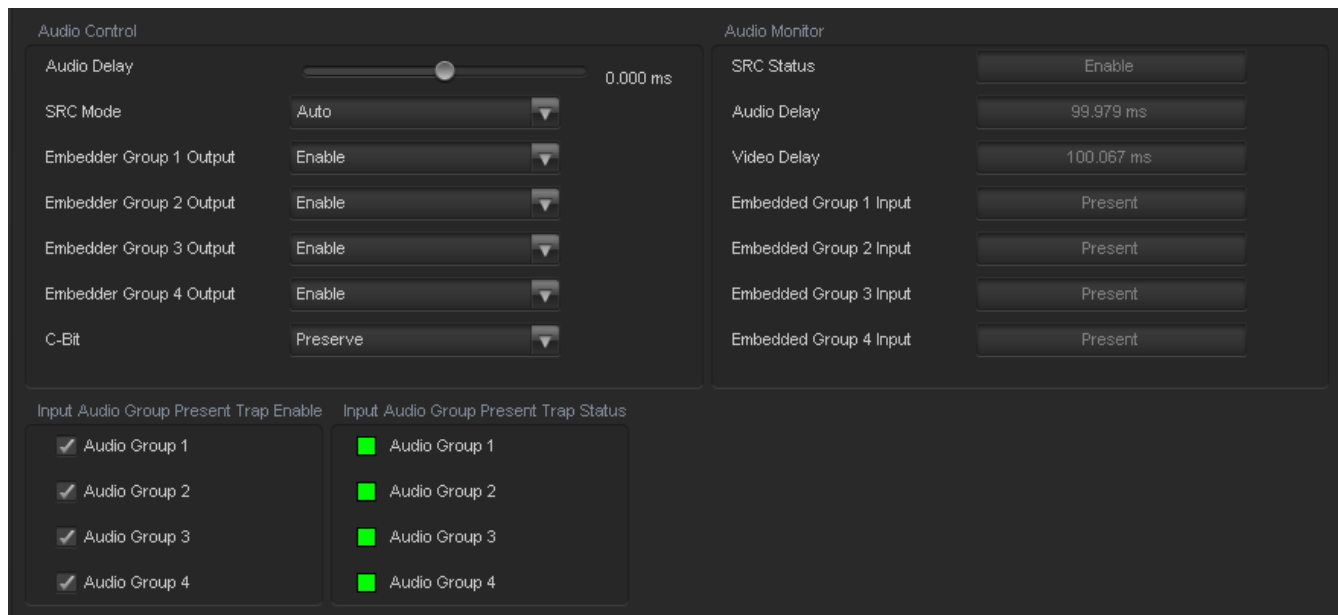


Figure 5-27 : Video Path Configuration - Audio



**NOTE:** Any changes to the audio settings will cause a momentary interruption on the output audio.

### Audio Control

**Audio Delay:** This control allows the user to adjust the audio delay +/- 350.00 ms. This delay is relative to the delay that the module automatically inserts to match video path delay. The audio delay can be adjusted with single sample precision.



**NOTE:** To advance the audio relative to video (*negative delay*), the video path must first be delayed using the *Added Video Delay* control on the Video tab.

**SRC Mode:** This control allows the user to adjust the operating mode of the audio sample rate converter (SRC). By selecting *Enable*, sample rate converters for PCM audio are enabled. By selecting *Bypass*, the sample rate converters are bypassed. By selecting *Auto*, the module will automatically detect either PCM or non-PCM audio and automatically turn on or off the SRCs as required.



**NOTE:** All SRCs are set to bypass as soon as a source of non-PCM audio is detected within any of the 16 internally processed audio channels.



**NOTE:** The ENABLE setting should NOT be used for non-PCM audio.

**Embedder Group 1 – 4 Output:** This control allows the user to enable or disable the insertion of the corresponding audio group into the output video signal. By selecting **Enable**, audio embedding for the selected group will be enabled. By selecting **Disable**, audio embedding for the selected group will be disabled.

**C-Bit:** This control allows the user to set the behaviour of C-Bit data in the embedded audio packets. By selecting **Preserve**, the option preserves/passes the C-Bit data from the audio inputs to the audio outputs. By selecting **Replace**, this option replaces the C-Bit settings to default values by the module.

### Audio Monitor

**SRC Status:** This field displays the status of the Sample Rate Converter (SRC). The SRC status will display either *Enable* or *Bypass*.

**Audio Delay:** This field displays the current delay/latency through the audio processing path in milliseconds (*ms*).

**Video Delay:** Reports the current video processing delay/latency through the module in milliseconds (*ms*).



**NOTE:** The audio delay will track the video delay unless the audio delay has been adjusted with respect to video delay using the *Audio Delay* control.

**Embedded Group 1 Input:** This field displays the presence of embedded audio group 1.

**Embedded Group 2 Input:** This field displays the presence of embedded audio group 2.

**Embedded Group 3 Input:** This field displays the presence of embedded audio group 3.

**Embedded Group 4 Input:** This field displays the presence of embedded audio group 4.

### Audio Group Present Traps

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

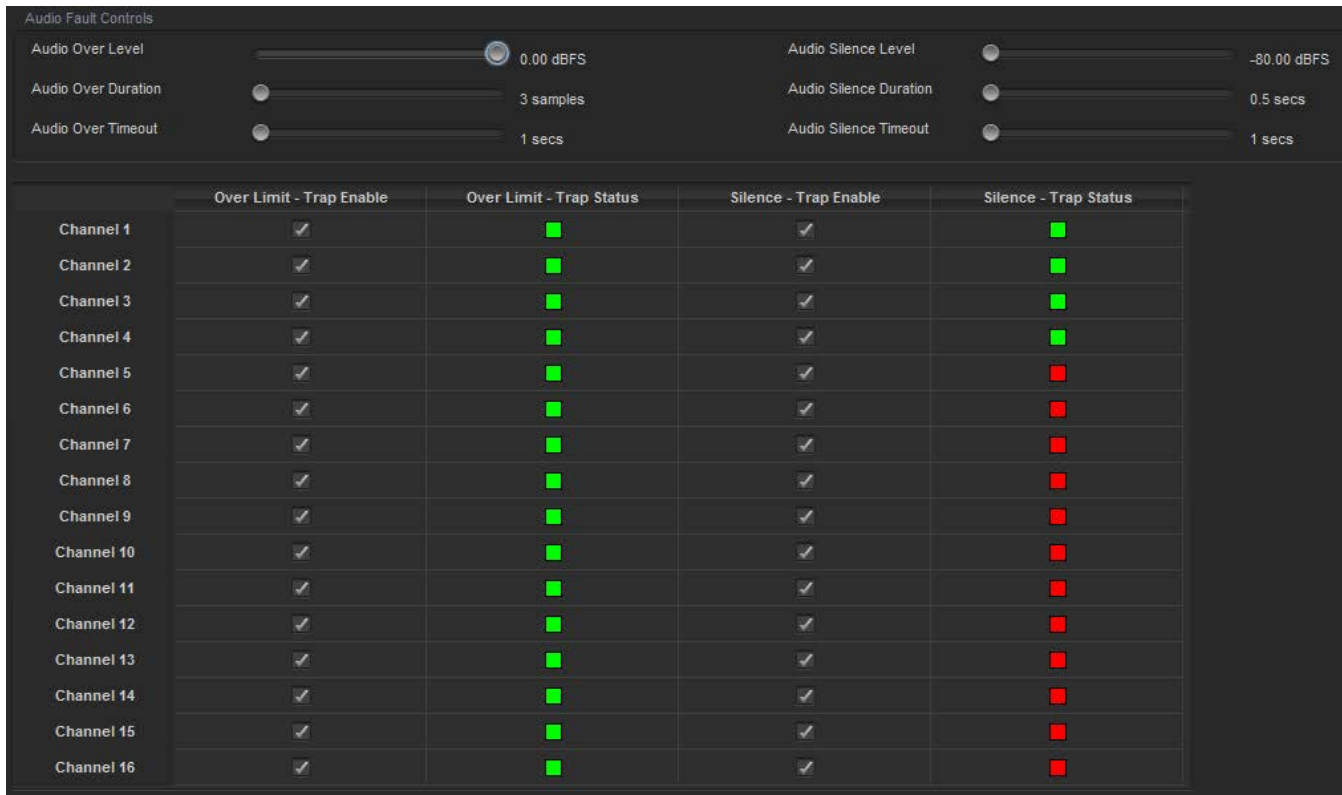
**Audio Group <1-4>:** These audio traps monitor the presence of embedded audio groups on the input video.



### 5.2.19. Audio Monitoring

The 7815VPDA series modules support advanced audio & video monitoring referred to as AVM. This advanced monitoring includes metrics for detecting potential silence or loudness in the audio signals.

Figure 5-28 illustrates the layout of the controls in the VistaLINK® PRO configuration view.



**Figure 5-28 : Video Path Configuration - Audio Monitoring**

### Audio Fault Control

**Audio Over Level:** This control sets the audio level threshold over which the audio is considered to be too loud. This value is expressed in dB full scale (FS) and can even be used to detect digital clipping. The value range is -30.00 to 0.00 dB in increments of 0.25 dB.

**Audio Over Duration:** This control sets the duration, in number of consecutive audio samples, that the audio must be at or above the *Audio Over level* before a fault condition exists. The value range is 3 to 255 audio samples in one-sample increments. The audio sample rate is 48 KHz.



**NOTE:** By setting longer *Over Duration* values, high frequency content that exceeds the loudness level may go undetected.

**Audio Over Timeout:** This control sets the number of seconds of consecutive audio samples that an audio channel must have amplitude below the *Audio Over level* before the corresponding audio channel *Over Limit Fault* will be cleared. The value range is from 1 to 127 seconds in increments of 1 second. The audio sample rate is 48 KHz.

**Audio Silence Level:** This control sets the audio level under which the audio is considered to be silent. This value is expressed in dB full scale (FS). The value range is -80.00 to -45.00 dB in 0.25 dB increments.

**Audio Silence Duration:** This control sets the duration, in seconds, that the audio must be at or below the silence level before a fault condition exists. The value range is 0.5 to 127.0 seconds in 0.5 second increments.

**Audio Silence Timeout:** This control sets the number of seconds of consecutive audio samples that an audio channel must have amplitude above the *Audio Silence level* before the corresponding audio channel *Silence Fault* will be cleared. The value range is from 1 to 127 seconds in increments of 1 second. The audio sample rate is 48 KHz.

### **Trap Enable and Trap Status**

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

**Audio Over Limit Traps<1-16>:** These traps will **trigger** when a set of consecutive audio samples of length greater than the *Audio Over Duration* all have an amplitude at or above the *Audio Over level*. These traps will **clear** when a set of consecutive audio samples of length greater than the *Audio Over Timeout* all have amplitude below the *Audio Over Level*.

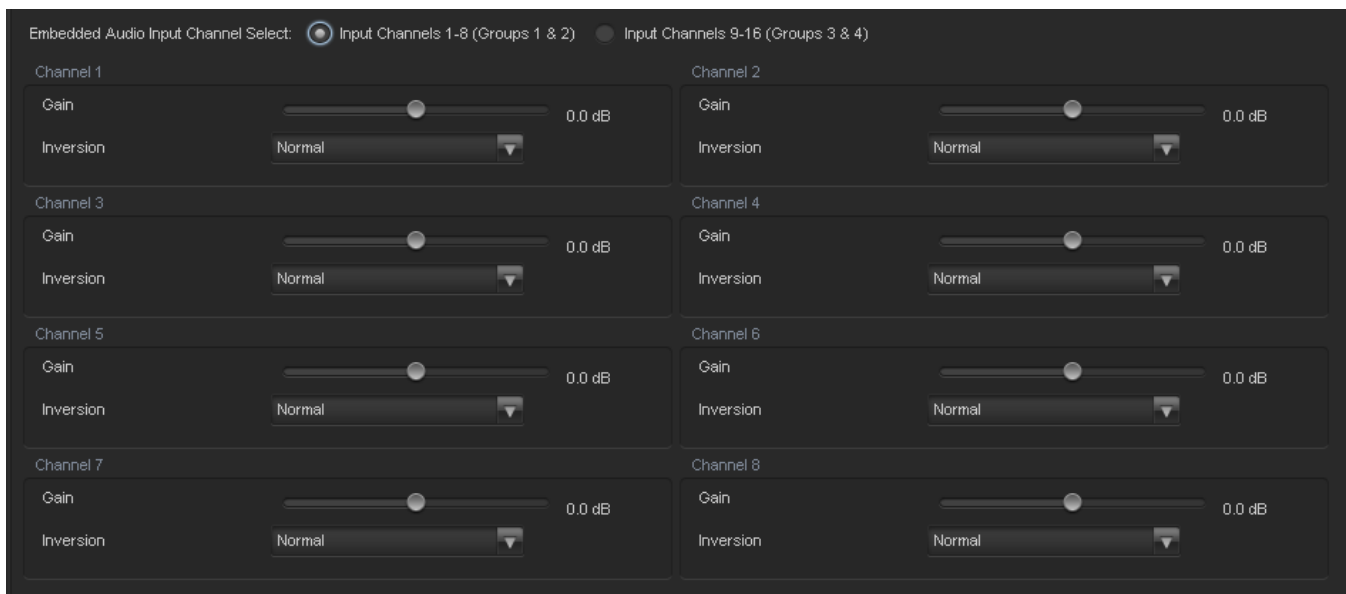
**Audio Silence Traps <1-16>:** These traps will **trigger** when a set of consecutive audio samples of length greater than the *Audio Silence Duration* all have an amplitude below the *Audio Silence level*. These traps will **clear** when a set of consecutive audio samples of length greater than the *Audio Silence Timeout* all have amplitude above the *Audio Silence Level*.

### 5.2.20. Embedded AIC

The Embedded AIC (Audio Input Correction) tab contains controls for adjustment of the 16 embedded audio channels present on the input video.

This purpose of audio input correction is to apply correction to an input signal before it is routed through other audio processing modules. For instance, the same input audio channel may feed both the embedded output mixer and the down-mix mixer. Rather than having to adjust the channel in two locations, a single adjustment can be made using the audio input correction controls.

Figure 5-29 illustrates the layout of the controls in the VistaLINK® PRO configuration view.



**Figure 5-29 : Video Path Configuration - Embedded AIC**

**Embedded Audio Input Channel Select:** This control allows the user to select *Input Channels 1-8 (Groups 1&2)* or *Input Channels 9-16 (Groups 3 & 4)*

#### Input Gain Controls

The *Gain* control enables the user to set the value of the gain for the selected input audio channel. The user can adjust the gain of the selected channel between -24 dB to +24 dB. Gain is adjustable by 0.1 dB increments.

#### Inversion Control

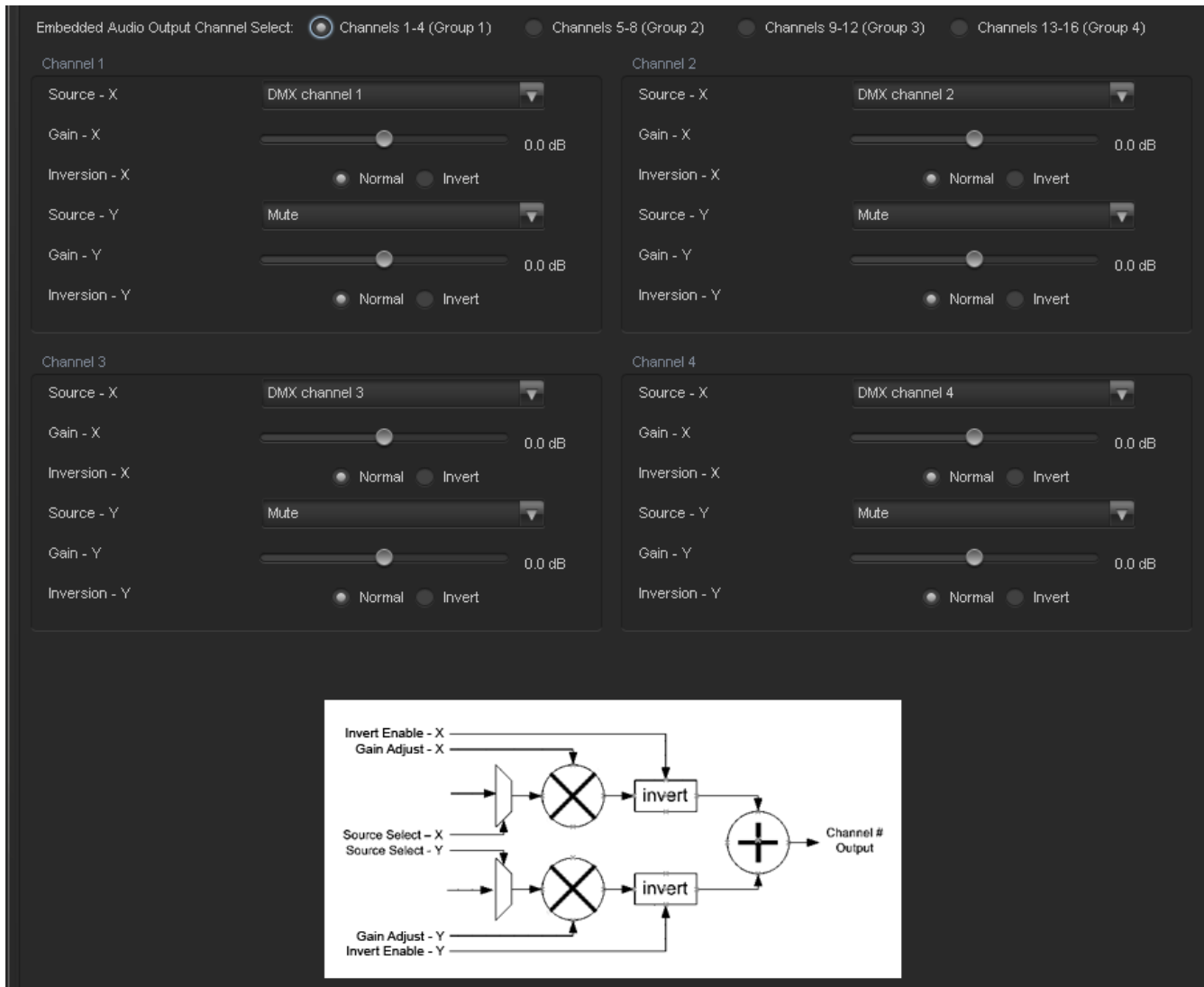
The *Inversion* control is used to invert the incoming audio channel. This control enables the user to invert the phase or pass the selected audio channel. By selecting **Normal**, the module will pass the audio channel through with no phase alteration. By selecting **Invert**, the module will invert the phase of the audio channel.

### 5.2.21. Embedded Audio Mixer

The Embedded Audio Mixer tab contains controls for audio routing, audio gain, and audio inversion for the 16 embedded audio channels present on the program output video. Each output audio channel mixer consists of two independently selectable sources (X & Y) with each source having its own gain and inversion controls. The selectable sources for the embedded audio mixers may vary based on the audio options enabled on the module. Table 5-10 lists all the selectable sources for the embedded audio mixers, and which sources are enabled by product options. Figure 5-30 illustrates the layout of these controls in the VistaLINK<sup>®</sup> PRO configuration view.

Product Option	Mixer Sources
All Products	Mute DMX channels 1-16 Mono mix DMX channels (8 pairs – 1&2, 3&4, etc.) Down mix L, R Down mix mono
Upmix [+UMX2]	Up mix L, R, C, LFE, Ls, Rs, passthru L, passthru R
IntelliGain <sup>®</sup> [+IG2]	IntelliGain <sup>®</sup> 1 channels 1-8 IntelliGain <sup>®</sup> 2 channels 1-8

**Table 5-10 : Embedded Audio Mixer - Selectable Audio Sources**



**Figure 5-30 : Video Path Configuration - Embedded Audio Mixer**

**Source – X & Y:** These controls allow the user to route one of the selectable mixer input audio sources to the Corresponding input (X or Y) of the embedded audio output channel mixer. Table 5-10 lists all the selectable sources for the embedded audio mixers.

**Gain – X & Y:** These controls allow the user to set the value of the gain for the mixer input channel (X or Y). The user can adjust the gain of the selected mixer channel (X or Y) by adjusting the corresponding slider control. The supported range for gain adjustments is **-24dB to +24dB**. The gain can be adjusted with **0.1dB** precision.

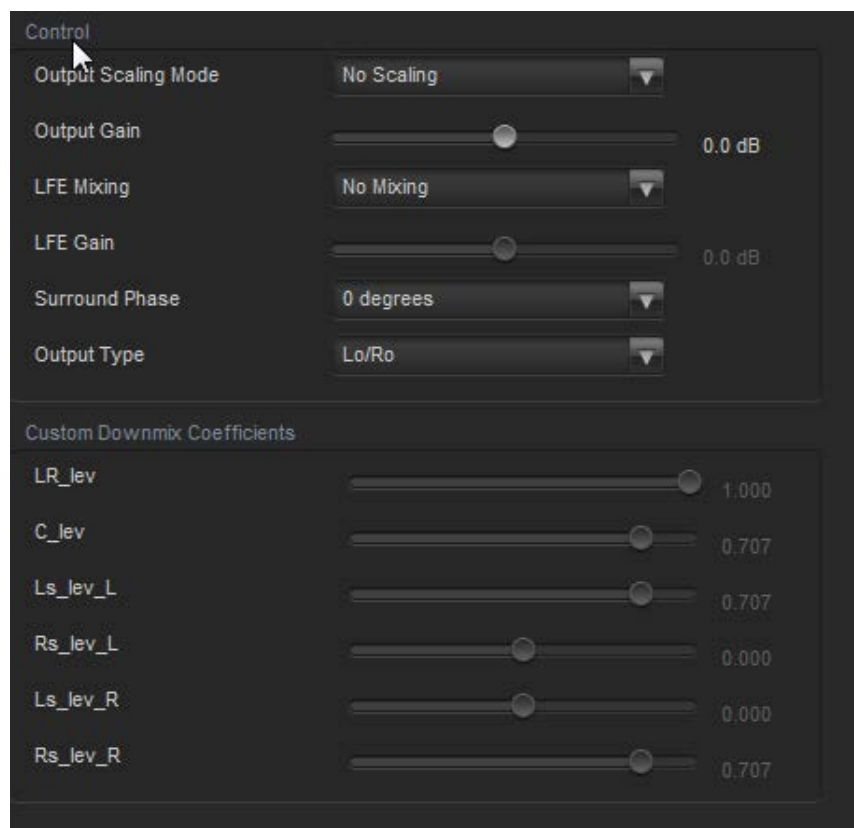
**Inversion – X & Y:** These controls allow the user to invert the phase (180 degree phase shift) of the corresponding mixer input channel. By selecting **Normal**, the module will pass the mixer input audio through with no processing. By selecting **Invert**, the module will invert the phase of the mixer input audio channel (X or Y).

### 5.2.22. Downmix

The Downmix audio processing module provides the ability to downmix 5.1 surround sound to 2-channel (stereo) sound, or single channel (mono) sound. The Downmix audio processor can be configured to utilize common downmixing algorithms (Lo/Ro, Lt/Rt) and is also fully user configurable.

To embed the Downmix audio processing module output onto the SDI program output, it must be selected as a source for the embedded audio output mixers.

Figure 5-31 illustrates the layout of these controls in the VistaLINK<sup>®</sup> PRO configuration view. The specific functionality of each control is described below.



**Figure 5-31 : Video Path Configuration - Downmix**

**Output Scaling Mode:** This control allows the user to determine whether the down mix matrixing is normalized or not. To normalize matrix coefficients, **Overflow Scaling must be selected**. Normalization of matrix coefficients will avoid any possibility of overflow, but it tends to lower the loudness level when compared against the original 5.1 input. If no normalization is applied, the stereo down-mix usually sounds at the similar levels as the 5.1 audio inputs. But clipping may occur when the input sound level is close to 0dB FS.

**Output Gain:** This control allows the user to configure the output gain of the Downmix audio processing outputs (Downmix L & R). The output gain ranges from -20 dB to +20 dB in 0.1 dB increments.

**LFE Mixing:** This control allows the user to control whether the LFE channel is included or not in the audio down-mixing.

**LFE Gain:** This control allows the user to adjust the gain applied to the LFE channel. This control is in effect only when **LFE Gain** is selected for **LFE Mixing** control. The range for this value can be set from -20.0dB to 20.0dB in 0.1 dB increments.

**Surround Phase:** This control allows the user to choose whether no phase shift (0 degrees) or a 90 degree phase shift is applied to the surround channels before being passed to the down-mix matrix. Select 0 degree if no 90-degree phase shift is needed. It is required that surround channels are 90-degree phase shifted for Dolby Prologic I decoding, but if surround channels in the 5.1 audio input are already 90-degree phase shifted, then the user should select 0 degree to avoid double 90-degree phase shifting. Normally, the 90 degrees phase shift is applied.

**Output Type:** This control allows the user to set the type of audio down-mixing that will be performed. The user may select from LoRo (Left Only and Right Only), LtRt (Left Total and Right Total) Prologic I and LtRt (Left Total and Right Total) Prologic II OR may choose to perform a Custom down-mix.

### **Custom Downmix Coefficients**

When the *Down Mix Type* is set to *Custom* the following equation will be used to generate the down-mixed audio.

$$L = (LR_{lev} \times L + C_{lev} \times C + LS_{levL} \times Ls\{0^\circ / 90^\circ\} + RS_{levL} \times Rs\{0^\circ / 90^\circ\} + lfe_{gain} \times LFE) \times gain \div norm$$

$$R = (LR_{lev} \times R + C_{lev} \times C + LS_{levR} \times Ls\{0^\circ / 90^\circ\} + RS_{levR} \times Rs\{0^\circ / 90^\circ\} + lfe_{gain} \times LFE) \times gain \div norm$$

Where  $lfe_{gain}$  is controlled by LFE Mixing and LFE Gain,  $gain$  is controlled by Output Gain and  $norm$  is controlled by Output Scaling Mode and where  $LR_{lev}$ ,  $C_{lev}$ ,  $LS_{levL}$ ,  $RS_{levL}$ ,  $LS_{levR}$  and  $RS_{levR}$  are custom specified user coefficients. These custom down-mixing coefficients are controlled using the appropriate slider bars in the *Custom Down mix Coefficients* control section in VISTALINK® PRO.

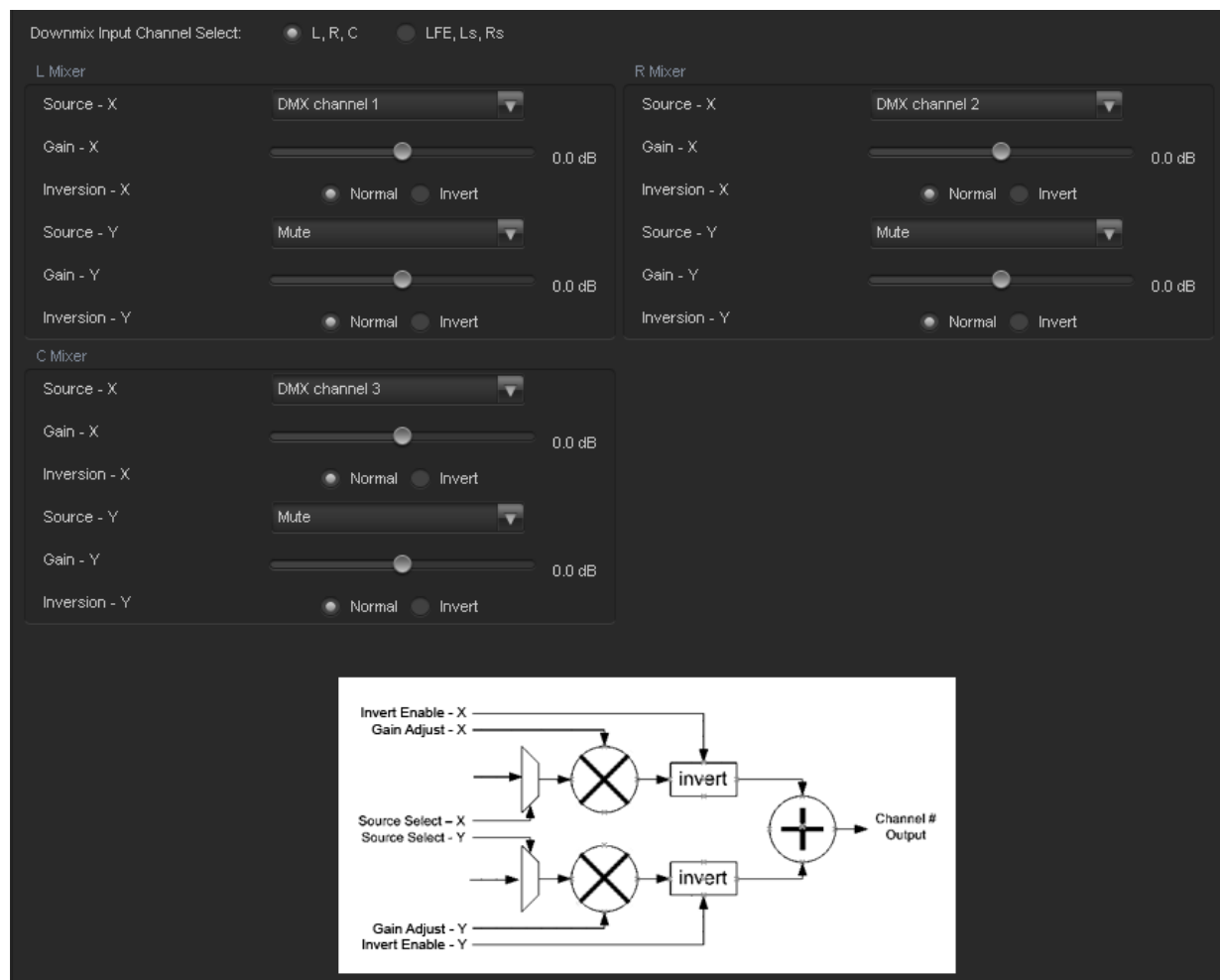
$LR_{lev}$	:	Ranges from 1.000 to -1.000 in increments of 0.001.
$C_{lev}$	:	Ranges from 1.000 to -1.000 in increments of 0.001.
$LS_{levL}$	:	Ranges from 1.000 to -1.000 in increments of 0.001.
$RS_{levL}$	:	Ranges from 1.000 to -1.000 in increments of 0.001.
$LS_{levR}$	:	Ranges from 1.000 to -1.000 in increments of 0.001.
$RS_{levR}$	:	Ranges from 1.000 to -1.000 in increments of 0.001.

### 5.2.23. Downmix Mixer

The Downmix Mixer tab contains controls for audio routing, audio gain, and audio inversion for the Downmix audio processing module input channels. Each Downmix input audio channel mixer consists of two independently selectable sources (X & Y) with each source having its own gain and inversion controls. The selectable sources for the Downmix audio mixers may vary based on the audio options enabled on the module. Table 5-11 lists all the selectable sources for the Downmix audio mixers, and which sources are enabled by product options. Figure 5-32 illustrates the layout of these controls in the VistaLINK<sup>®</sup> PRO configuration view.

Product Option	Mixer Sources
All Products	Mute DMX channels 1-16 Mono mix DMX channels (8 pairs – 1&2, 3&4, etc.)
Upmix [+UMX2]	Up mix L, R, C, LFE, Ls, Rs, passthru L, passthru R
IntelliGain <sup>®</sup> [+IG2]	IntelliGain <sup>®</sup> 1 channels 1-8 IntelliGain <sup>®</sup> 2 channels 1-8

**Table 5-11 : Downmix Mixer - Selectable Audio Sources**



**Figure 5-32 : Video Path Configuration - Downmix Mixer**



**Downmix Input Channel Select:** These option buttons allow the user to toggle between configuration of Downmix input channel mixers L,R,C and LFE, Ls, Rs.

**Source – X & Y:** These controls allow the user to route one of the selectable mixer input audio sources to the corresponding input (X or Y) of the Downmix input channel mixer. Table 5-11 lists all the selectable sources for the Downmix audio mixers.

**Gain – X & Y:** These controls allow the user to set the value of the gain for the mixer input channel (X or Y). The user can adjust the gain of the selected mixer channel (X or Y) by adjusting the corresponding slider control. The supported range for gain adjustments is **-24dB to +24dB**. The gain can be adjusted with **0.1dB** precision.

**Inversion – X & Y:** These controls allow the user to invert the phase (180 degree phase shift) of the corresponding mixer input channel. By selecting **Normal**, the module will pass the mixer input audio through with no processing. By selecting **Invert**, the module will invert the phase of the mixer input audio channel (X or Y).

### Upmix [+UMX2]

The Upmix audio processing module provides the ability to upmix 2-channel (stereo) sound to 5.1 surround sound. The Upmix audio processing module is an **optional product feature**, and requires the Upmix ordering option **[+UMX2]** to be included in the module's product string. This feature is an upgradeable product option, and can be purchased and added to 7815VPDA modules that do not currently have this product option. The **[+UMX2]** product option includes a dedicated Upmix audio processing module for each video processing path.



**NOTE:** Please contact Evertz if interested in adding the Upmix [+UMX2] product option.

When operating in *Auto* mode, the Upmix audio processor can automatically detect the presence of 5.1 surround sound on its input audio channels. If 5.1 surround sound is detected, the upmix audio processing module simply passes the audio through. If 5.1 surround is not detected, the upmix audio processing module automatically performs a 5.1 upmix of the 2-channel stereo input. This ensures the output of the upmix audio processing module is always 5.1 surround sound regardless of the state of its input audio.

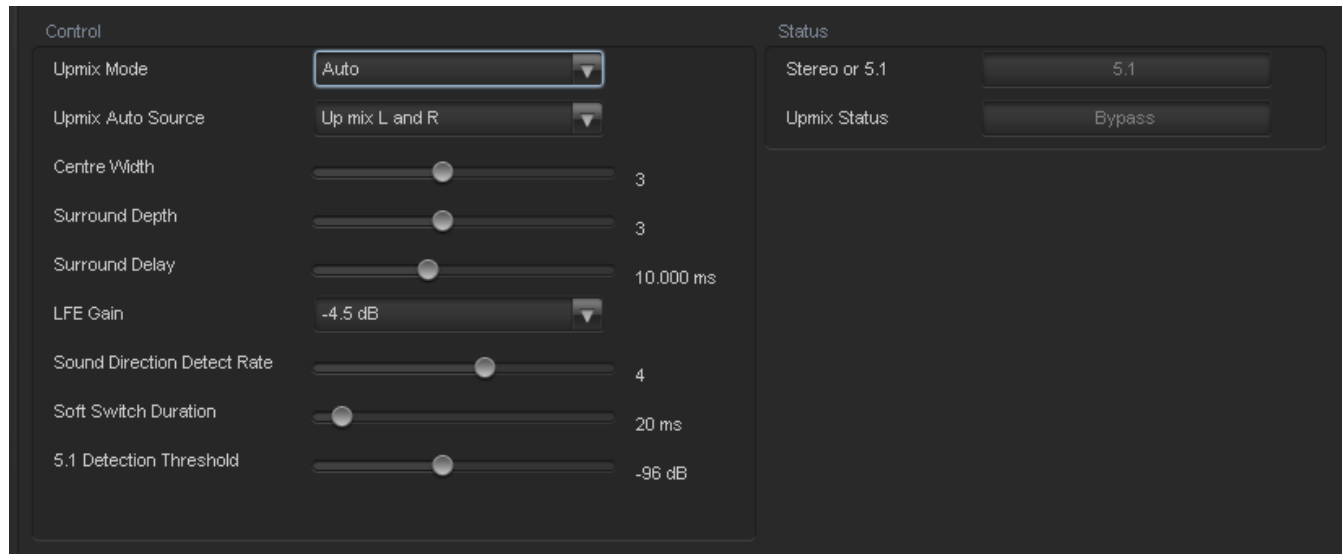
The upmix audio processing module can also be forced to always upmix its input audio if automatic detection of 5.1 surround sound is not desired.

To embed the Upmix audio processing module output onto the SDI program output, it must be selected as a source for the embedded audio output mixers.

There are a number of user controls available to configure the operation of the Upmix audio processing module. Figure 5-33 illustrates the layout of these controls in the VistaLINK<sup>®</sup> PRO configuration view. The specific functionality of each control is described below.



**NOTE:** The Upmix tab is only visible when [+UMX2] is included in the module's product string.



**Figure 5-33 : Video Path Configuration - Upmix**

**Upmix Mode:** This control allows the user to set the upmix audio processing module to automatically determine if the audio needs to be upmixed. It can automatically detect the presence of 5.1 surround sound on its inputs. When set to **Auto**, the upmix audio processing module will determine if 5.1 is present. If 5.1 is not present it will up-mix the audio to 5.1 surround sound. If 5.1 is present, it will pass the input to its output. When set to **Force**, the upmix audio processing module will always upmix the incoming audio. When set to **Disable**, the upmix audio processing module will not upmix the audio and instead just pass the input audio to its output.

**Upmix Auto Source:** This control allows the user to set the 2-channel (stereo) audio source when performing an upmix. When set to **Up mix L and R**, it will perform an upmix on the Up mix L and R input channels when operating in upmix mode. When set to **Up mix passthru L and R**, it will perform an upmix on the Up mix passthru L and R input channels when operating in upmix mode.

**Centre Width:** This control allows the user to set the width of front centre sound in the perceived sound image when listening to upmix audio processing module output. It mainly affects the perception of speech and dialogue. Narrower centre width will cause the front centre sound primarily coming from the centre speaker. Wider centre width causes the front centre sound comes from the centre, left and right speakers. The value range is 0 (minimum width) to 7 (maximum width) in increments of 1.

**Surround Depth:** This control allows the user to set the depth of surround sound in the perceived sound image when listening to upmix audio processing module output. More sound will be directed to the front speakers (centre, left and right speakers) if a shallower surround depth is selected. If a deeper surround depth is selected, more sound will be shifted to the surround speakers. The value range is 0 (shallowest) to 7 (deepest) in increments of 1.

**Surround Delay:** This control allows the user to set the amount of time that the surround sound will be delayed against other channels (in milliseconds). The proper amount of surround delay will provide a good perception of surround sound. The value range is 4.000 ms (shortest) to 20.000 ms (longest) in increments of 0.021 ms.

**LFE Gain:** This control allows the user to set LFE channel gain at the upmix audio processing module output. Use the drop down menu to select the appropriate amount of gain to be applied.

<b>Mute</b>	Mute the LFE channel in the up-mixed audio.
<b>+ 0 dB</b>	Apply 0 dB gain to the generated LFE channel.
<b>-1.5 dB</b>	Apply –1.5 dB gain to the generated LFE channel.
<b>-3.0 dB</b>	Apply –3.0 dB gain to the generated LFE channel.
<b>-4.5 dB</b>	Apply –4.5 dB gain to the generated LFE channel.
<b>-6.0 dB</b>	Apply –6.0 dB gain to the generated LFE channel.
<b>-7.5 dB</b>	Apply –7.5 dB gain to the generated LFE channel.
<b>-9.0 dB</b>	Apply –9.0 dB gain to the generated LFE channel.

**Table 5-12 : Upmix - LFE Gain Levels**

**Sound Direction Detect Rate:** This control allows the user to set the detection rate of sound direction. The up-mixer constantly calculates the sound image that would be perceived from the stereo audio input. If the sound direction shifts in the sound image, the up-mixer changes the output sound direction accordingly by switching the amount of sound going to different speakers. If faster detection rate is selected, the sound direction switching may sound more dramatic, but may also be felt as unnatural. On the other hand, slower detection rate would sound dull and uninteresting. The value range is 0 (slowest rate) to 7 (fastest rate) in increments of 1.

**Soft Switch Duration:** This control allows the user to set the transition time when the upmix module switches modes from 5.1 bypass to upmix and vice versa. The duration can range from 5ms to 200 ms in increments of 1 ms.

**5.1 Detection Threshold:** This control allows the user to set what level of audio is declared as not present. When audio on channels C, LFE, Ls, and Rs are all below this level then 5.1 surround sound is considered to be not present, and upmix processing will be performed if necessary.

**Stereo or 5.1:** This status field reports the type of audio detected on the input of the audio upmix processing module.

**Upmix Status:** This status field reports the current operating mode (*Upmix or Bypass*) of the audio upmix processing module.

#### 5.2.24. Upmix Mixer [+UMX2]

The Upmix Mixer tab contains controls for audio routing, audio gain, and audio inversion for the Upmix audio processing module input channels. Each Upmix input audio channel mixer consists of two independently selectable sources (X & Y) with each source having its own gain and inversion controls. The selectable sources for the Upmix audio mixers may vary based on the audio options enabled on the module. Table 5-13 lists all the selectable sources for the Upmix audio mixers, and which sources are enabled by product options. Figure 5-34 illustrates the layout of these controls in the VistaLINK® PRO configuration view.



**NOTE:** The Upmix Mixer tab is only visible when [+UMX2] is included in the module's product string.

Product Option	Mixer Sources
All Products	Mute DMX channels 1-16 Mono mix DMX channels (8 pairs – 1&2, 3&4, etc.) Down mix L, R Down mix mono
IntelliGain <sup>®</sup> [+IG2]	IntelliGain <sup>®</sup> 1 channels 1-8 IntelliGain <sup>®</sup> 2 channels 1-8

**Table 5-13 : Upmix Mixer - Selectable Audio Sources**

Upmix Input Channel Select : ☒ L, R, C, LFE ☐ Ls, Rs, Pass L, Pass R

Up mix L

Source - X: DMX channel 1

Gain - X: 0.0 dB

Inversion - X: ☒ Normal ☐ Invert

Source - Y: Mute

Gain - Y: 0.0 dB

Inversion - Y: ☒ Normal ☐ Invert

Up mix R

Source - X: DMX channel 2

Gain - X: 0.0 dB

Inversion - X: ☒ Normal ☐ Invert

Source - Y: Mute

Gain - Y: 0.0 dB

Inversion - Y: ☒ Normal ☐ Invert

Up mix C

Source - X: DMX channel 3

Gain - X: 0.0 dB

Inversion - X: ☒ Normal ☐ Invert

Source - Y: Mute

Gain - Y: 0.0 dB

Inversion - Y: ☒ Normal ☐ Invert

Up mix LFE

Source - X: DMX channel 4

Gain - X: 0.0 dB

Inversion - X: ☒ Normal ☐ Invert

Source - Y: Mute

Gain - Y: 0.0 dB

Inversion - Y: ☒ Normal ☐ Invert

**Figure 5-34 : Video Path Configuration - Upmix Mixer**

**Upmix Input Channel Select:** These option buttons allow the user to toggle between configuration of Upmix input channel mixers L, R, C, LFE and Ls, Rs, Passthru L, Passthru R.

**Source – X & Y:** These controls allow the user to route one of the selectable mixer input audio sources to the corresponding input (X or Y) of the Upmix input channel mixer. Table 5-13 lists all the selectable sources for the Upmix audio mixers

**Gain – X & Y:** These controls allow the user to set the value of the gain for the mixer input channel (X or Y). The user can adjust the gain of the selected mixer channel (X or Y) by adjusting the corresponding slider control. The supported range for gain adjustments is **-24dB to +24dB**. The gain can be adjusted with **0.1dB** precision.

**Inversion – X & Y:** These controls allow the user to invert the phase (180 degree phase shift) of the corresponding mixer input channel. By selecting **Normal**, the module will pass the mixer input audio through with no processing. By selecting **Invert**, the module will invert the phase of the mixer input audio channel (X or Y).

### 5.2.25. IntelliGain<sup>®</sup> [+IG2]

IntelliGain<sup>®</sup> is a technology developed by Evertz to control the loudness of audio programs on the fly. More specifically, it calculates the perceived loudness of the input audio and modifies the audio to ensure that the long-term average loudness level is at the target level. IntelliGain<sup>®</sup> works with mono, stereo and multi-channel audio per program and can handle up to 16 programs simultaneously. The objective loudness calculation is based on ITU Recommendation (ITU-R BS.1770-3), "Algorithms to measure audio program loudness and true-peak audio level". This recommendation provides equations for calculating loudness over mono, stereo and multi-channel audio programs. IntelliGain<sup>®</sup> constantly calculates audio program loudness. When the loudness is over the target level, it reduces the gain; and when the loudness is below the target level, it increases the gain. The gain adjustment smoothness is user-controllable by setting attack and release times.

The IntelliGain<sup>®</sup> audio processing module is an **optional product feature**, and requires the IntelliGain<sup>®</sup> product option **[+IG2]** to be included in the module's product string. This feature is an upgradeable product option, and can be purchased and added to 7815VPDA modules that do not currently have this product option. The **[+IG2]** product option includes a dedicated 16 channel IntelliGain<sup>®</sup> audio processing module for each video processing path.



**NOTE:** Please contact Evertz if interested in adding the IntelliGain<sup>®</sup> [+IG2] product option.

#### Features:

- Normalize loudness of audio programs to a target level
- Supports up to 16 programs and 16 channels
- Relatively constant gain within a program interval to preserve audio dynamic range
- Simultaneously process multiple multi-channel programs
- User adjustable attack and release times
- Applied loudness algorithm ITU-R BS. 1770-3
- Peak limiting
- LKFS calculations
- Momentary, short term and integrated loudness measurements

### 5.2.25.1. IntelliGain® Mixer [+IG2]

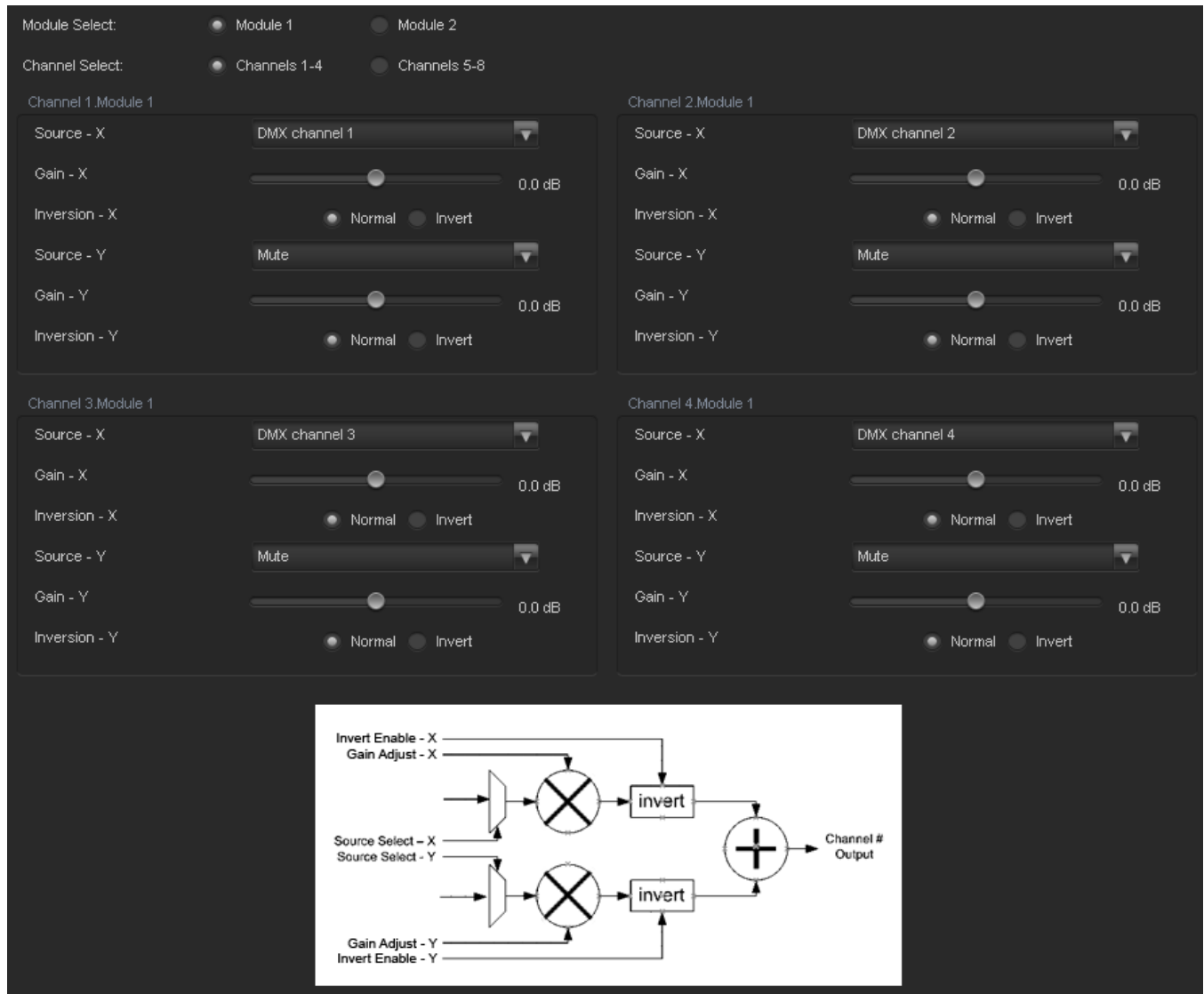
The IntelliGain® Mixer tab contains controls for audio routing, audio gain, and audio inversion for the IntelliGain® audio processing module input channels. Each IntelliGain® input audio channel mixer consists of two independently selectable sources (X & Y) with each source having its own gain and inversion controls. The selectable sources for the IntelliGain® audio mixers may vary based on the audio options enabled on the module. Table 5-14 lists all the selectable sources for the IntelliGain® audio mixers, and which sources are enabled by product options. Figure 5-35 illustrates the layout of these controls in the VistaLINK® PRO configuration view.



**NOTE:** The IntelliGain® Mixer tab is only visible when **[+IG2]** is included in the module's product string.

Product Option	Mixer Sources
All Products	Mute DMX channels 1-16 Mono mix DMX channels (8 pairs – 1&2, 3&4, etc.) Down mix L, R Down mix mono
Upmix [+UMX2]	Up mix L, R, C, LFE, Ls, Rs, passthru L, passthru R

**Table 5-14 : IntelliGain® Mixer - Selectable Audio Sources**



**Figure 5-35 : Video Path Configuration - IntelliGain® Mixer**

**Module & Channel Select:** These option buttons allow the user to toggle between configuration of IntelliGain® Module 1 & 2 and input channel mixers 1-4 and 5-8.

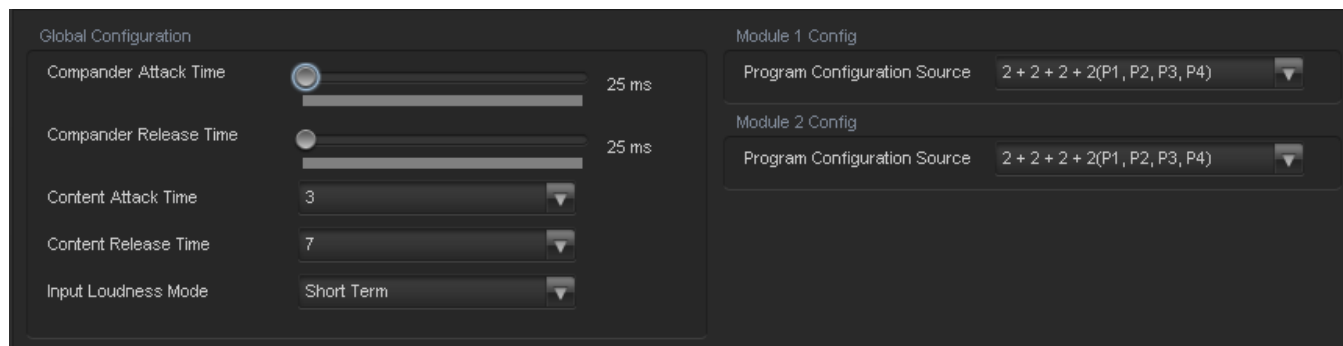
**Source – X & Y:** These controls allow the user to route one of the selectable mixer input audio sources to the corresponding input (X or Y) of the IntelliGain® input channel mixer. Table 5-14 lists all the selectable sources for the IntelliGain® audio mixers

**Gain – X & Y:** These controls allow the user to set the value of the gain for the mixer input channel (X or Y). The user can adjust the gain of the selected mixer channel (X or Y) by adjusting the corresponding slider control. The supported range for gain adjustments is **-24dB to +24dB**. The gain can be adjusted with **0.1dB** precision.

**Inversion – X & Y:** These controls allow the user to invert the phase (180 degree phase shift) of the corresponding mixer input channel. By selecting **Normal**, the module will pass the mixer input audio through with no processing. By selecting **Invert**, the module will invert the phase of the mixer input audio channel (X or Y).

### 5.2.25.2. IntelliGain® Configuration [+IG2]

The IntelliGain™ Configuration tab displays the top-level IntelliGain™ control interface. There are a number of parameters that control both the intelligent leveller and the on-board dynamic processor (compressor, expander, and limiter). Figure 5-36 illustrates the layout of these controls in the VistaLINK® PRO configuration view. The specific functionality of each control is provided below.



**Figure 5-36 : Video Path Configuration - IntelliGain® Configuration**

#### Global Configuration

**Compander Attack Time:** This control allows the user to set how quickly the compander reacts to an increase in the input loudness. The value range is 10 ms to 2000 ms (2 sec).

**Compander Release Time:** This control allows the user to set how quickly the compander reacts to a decrease in the input loudness. The compander release time should be greater than or equal to the *Compander Attack Time*. The value range is 10 ms to 2000 ms (2 sec).

**Leveler Attack Mode:** This control allows the user to set the maximum integration time that is applied when loudness decreases during a program period. The actual integration time is content dependent. For more responsive results, set the attack time to a smaller value. The value range is 1 (most responsive) to 12 (least responsive)

**Input Loudness Mode:** This control allows the user to set the window that will be used to produce the *Input Loudness*.

**Program Configuration Source:** This control defines how the input audio channels are grouped together into programs for the IntelliGain® audio loudness processing. Up to eight channels can be grouped together in individual programs, where each program contains its own metadata. IntelliGain® uses this parameter to configure multiple internal settings.



**NOTE:** It is important to follow the program to channel mapping guidelines. For example, Program Configuration Source 2 + 2 + 2 + 2 defines audio program 1 mapped to input channels 1 & 2, audio program 2 mapped to input channels 7 & 8, audio program 3 mapped to input channels 3 & 4 and audio program 4 mapped to input channels 5 & 6. Program Configuration Source 2 + 2 + 2 + 2 (p1, p3, p4, p2) has the audio program mapped sequentially.



Table 5-15 provides a list of IntelliGain® program to input audio channel mapping guidelines. For example, configuration 5.1+2, program 1 (P1) is mapped to channel CH1 to CH6 and program 2 (P2) is mapped to channel CH7 to CH8.

Program Configuration	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8
5.1+2	P1-L	P1-R	P1-C	P1-LFE	P1-Ls	P1-Rs	P2-L	P2-R
5.1 + 1 + 1	P1-L	P1-R	P1-C	P1-LFE	P1-Ls	P1-Rs	P2-C	P3-C
4 + 4	P1-L	P1-R	P1-C	P1-S	P2-C	P2-S	P2-L	P2-R
4 + 2 + 2	P1-L	P1-R	P1-C	P1-S	P3-L	P3-R	P2-L	P2-R
4 + 2 + 1 + 1	P1-L	P1-R	P1-C	P1-S	P3-C	P4-C	P2-L	P2-R
4 + 1 + 1 + 1 + 1	P1-L	P1-R	P1-C	P1-S	P4-C	P5-C	P2-C	P3-C
2 + 2 + 2 + 2	P1-L	P1-R	P3-L	P3-R	P4-L	P4-R	P2-L	P2-R
2 + 2 + 2 + 1 + 1	P1-L	P1-R	P3-L	P3-R	P4-C	P5-C	P2-L	P2-R
2 + 2 + 1 + 1 + 1 + 1	P1-L	P1-R	P3-C	P4-C	P5-C	P6-C	P2-L	P2-R
2 + 1 + 1 + 1 + 1 + 1	P1-L	P1-R	P4-C	P5-C	P6-C	P7-C	P2-C	P3-C
1 + 1 + 1 + 1 + 1 + 1 + 1 + 1	P1-C	P2-C	P3-C	P4-C	P5-C	P6-C	P7-C	P8-C
5.1	P1-L	P1-R	P1-C	P1-LFE	P1-Ls	P1-Rs	None	None
4 + 2	P1-L	P1-R	P1-C	P1-S	None	None	P2-L	P2-R
4 + 1 + 1	P1-L	P1-R	P1-C	P1-S	None	None	P2-C	P3-C
2 + 2 + 2	P1-L	P1-R	P3-L	P3-R	None	None	P2-L	P2-R
2 + 2 + 1 + 1	P1-L	P1-R	P3-C	P4-C	None	None	P2-L	P2-R
2 + 1 + 1 + 1 + 1	P1-L	P1-R	P4-C	P5-C	None	None	P2-C	P3-C
1 + 1 + 1 + 1 + 1 + 1	P1-C	P2-C	P3-C	P4-C	P5-C	P6-C	None	None
4	P1-L	P1-R	P1-C	P1-S	None	None	None	None
2 + 2	P1-L	P1-R	None	None	None	None	P2-L	P2-R
2 + 1 + 1	P1-L	P1-R	None	None	None	None	P2-C	P3-C
1 + 1 + 1 + 1	P1-C	P2-C	P3-C	P4-C	None	None	None	None
7.1	P1-L	P1-R	P1-C	P1-LFE	P1-Ls	P1-Rs	P1-Bsl	P1-Bsr
7.1 Screen	P1-L	P1-R	P1-C	P1-LFE	P1-Ls	P1-Rs	P1-Le	P1-Re
2 + 5.1	P1-L	P1-R	P2-L	P2-R	P2-C	P2-LFE	P2-Ls	P2-Rs
1 + 1 + 5.1	P1-C	P2-C	P3-L	P3-R	P3-C	P3-LFE	P3-Ls	P3-Rs
2 + 2 + 2 + 2 (p1, p2, p3, p4)	P1-L	P1-R	P2-L	P2-R	P3-L	P3-R	P4-L	P4-R
2 + 2 + 2 + 1 + 1 (p1, p2, p3, p4, p5)	P1-L	P1-R	P2-L	P2-R	P3-L	P3-R	P4-C	P5-C
2 + 2 + 2 (p1, p2, p3)	P1-L	P1-R	P2-L	P2-R	P3-L	P3-R	None	None

**Table 5-15 : IntelliGain® - Relationship between IntelliGain® Audio Programs and Audio Channels**

Abbreviations	Description
P	Program
CH	Channel
L	Left or left front
R	Right or right front
C	Center or mono
LFE	Low frequency effect
Ls	Left surround
Rs	Right surround
Bsl	Back surround left
Bsr	Back surround right

**Table 5-16 : IntelliGain<sup>®</sup> - Channel Mapping Abbreviations**

### 5.2.25.3. IntelliGain® Program Control [+IG2]

The IntelliGain® Program Control tab contains the program configuration controls for the individual IntelliGain® audio programs. Figure 5-37 illustrates the layout of these controls in the VistaLINK® PRO configuration view. The specific functionality of each control is provided below.

The screenshot displays the IntelliGain Program Control interface for Program 1. At the top, there are 'Module Select' and 'Program Select' buttons. The 'Module Select' section has radio buttons for Module 1 (selected), Module 2, and Module 3. The 'Program Select' section has radio buttons for Program 1 (selected), Program 2, Program 3, Program 4, Program 5, Program 6, Program 7, and Program 8.

The main controls are organized into several sections:

- Program 1 IntelliGain:** Includes 'Intelligain State' (Enable) and 'Program 1 Leveler' (Enable).
- Program 1 Leveler:** Includes sliders for 'Target Loudness' (-25 dB), 'Maximum Gain' (30 dB), 'Noise Floor Threshold' (-40 dB), and 'Hold Time' (10 s).
- Program 1 Compressor:** Includes 'Compressor Profile' (Film Standard), 'Compressor State' (Enable), and 'Makeup Gain' (0 dB).
- Program 1 Peak Limiter:** Includes a 'Peak Limit' slider (-1 dB).
- Program 1 IntelliGain Threshold Minor:** Includes sliders for 'Gain Level' (-1 dB), 'Fault Duration' (0.5 secs), and 'Clear Duration' (0.5 secs).
- Program 1 IntelliGain Threshold Major:** Includes sliders for 'Gain Level' (-1 dB), 'Fault Duration' (0.5 secs), and 'Clear Duration' (0.5 secs).
- Program 1 IntelliGain Threshold Critical:** Includes sliders for 'Gain Level' (-1 dB), 'Fault Duration' (0.5 secs), and 'Clear Duration' (0.5 secs).
- Program 1 Monitor:** Includes 'Input Loudness' (-20.0 LKFS), 'Gain Applied' (-5.6 dB), and 'Output Loudness' (-25.6 LKFS).
- Program 1 Integrated Loudness Meter:** Includes 'Integrated Loudness' (0.0 LKFS), 'Maximum Loudness' (0.0 LKFS), 'Loudness Range' (0.0 LU), 'Loudness Range Low' (0.0 LUFS), and 'Loudness Range High' (0.0 LUFS). It also has 'Reset', 'Start/Continue', and 'Stop/Pause' buttons.

Figure 5-37 : Video Path Configuration - IntelliGain® Program Control

**Module & Program Select:** These option buttons allow the user to select the desired program for configuration.



**NOTE:** Only the valid programs will be selectable for configuration. The valid programs are determined by the value of the *Program Configuration Source* control.

### Program IntelliGain

**IntelliGain® State:** This control allows the user to set the master switch for the IntelliGain™ processor, which is used for the given audio program. Select **Enable** to initiate IntelliGain® processing, and select **Disable** to deactivate IntelliGain® processing.

### Program Leveler

**Leveler State:** This control allows the user to activate the IntelliGain™ audio leveler. The leveler is used to level each individual audio channel to the target loudness level. Set this control to **Enable** or **Disable**, to activate or deactivate the IntelliGain™ audio leveler.

**Target Loudness:** This control allows the user to set the target loudness level for the given audio program. The IntelliGain™ processor will level the audio to this value. The value range is -35 dBFS to -15dBFS.



**NOTE:** If the compander is enabled, it is desirable to set the target loudness parameter to the range (-31 dBFS to -26 dBFS) and use *Makeup Gain* control to reach the final desired target loudness level.

**Maximum Gain:** This control allows the user to set total amount of gain that the IntelliGain™ engine will apply. For example, setting this control to 10 LKFS indicates that IntelliGain™ is not to add anymore than 10 LKFS of gain to the audio program, even if the audio program requires more gain to reach the target loudness level. The value range is 0 LKFS to 40 LKFS.

**Noise Floor Threshold:** This control allows the user to set the audio threshold level for IntelliGain™ processing. Audio levels below this value will not have IntelliGain™ processing applied. The value range is -70 dBFS to -40 dBFS.

**Hold Time:** This control allows the user to set the hold time for the given audio program. The IntelliGain™ processor will wait this period of time to add gain once the level goes below the target loudness. By selecting **Immediate**, the IntelliGain® processor will immediately process incoming audio. The user can also define the amount of time before applying processing; this range can be set from **1 – 14 seconds**. By selecting **Adaptive**, the processor will vary the hold time depending on the content for optimal sound quality.

### Program Compander

**Compander Profile:** The compander profiles are used to define the dynamic range control of the compander. There are 5 default profiles.

**Film Standard:** This profile is used to compress/expand sporting events, and movies with a large dynamic range.

Max Boost: 6 dB (below -43 dB)  
Boost Range: -43 to -31 dB (2:1 ratio)  
Null Band Width: 5 dB (-31 to -26 dB)  
Early Cut Range: -26 to -16 dB (2:1 ratio)

Cut Range: -16 to +4 dB (20:1 ratio)

**Film Light:** This profile is used to compress/expand light movies or program content such as dramas or content with less dynamic range.

Max Boost: 6 dB (below –53 dB)  
Boost Range: –53 to –41 dB (2:1 ratio)  
Null Band Width: 20 dB (–41 to –21 dB)  
Early Cut Range: –26 to –11 dB (2:1 ratio)  
Cut Range: –11 to +4 dB (20:1 ratio)

**Speech:** This profile is used to compress/expand content such as news, documentaries or “talking head” type content.

Max Boost: 15 dB (below –50 dB)  
Boost Range: –50 to –31 dB (5:1 ratio)  
Null Band Width: 5 dB (–31 to –26 dB)  
Early Cut Range: –26 to –16 dB (2:1 ratio)  
Cut Range: –16 to +4 dB (20:1 ratio)

**Music Standard:** This profile is used in most typical music environments such as concerts, music videos and music content with a wide dynamic range.

Max Boost: 12 dB (below –55 dB)  
Boost Range: –55 to –31 dB (2:1 ratio)  
Null Band Width: 5 dB (–31 to –26 dB)  
Early Cut Range: –26 to –16 dB (2:1 ratio)  
Cut Range: –16 to +4 dB (20:1 ratio)

**Music Light:** This profile is used to compress/expand music content with a narrow dynamic range.

Max Boost: 12 dB (below –65 dB)  
Boost Range: –65 to –41 dB (2:1 ratio)  
Null Band Width: 20 dB (–41 to –21 dB)  
Cut Range: –21 to +9 dB (2:1 ratio).

**Compander State:** This control allows the user to activate the on-board compressor/expander, otherwise known as the compander. The use of the compander allows audio signals with a large dynamic range to be transmitted over facilities that have a smaller dynamic range capability. The compander works by compressing or expanding the dynamic range of the audio signal.

**Makeup Gain:** This control allows the user to add additional gain to the audio program. This control can be used if the final desired target loudness has not been reached after IntelliGain® processing. The value range is 0 dBFS to 20 dBFS.

### **Program Peak Limiter**

**Peak Limit:** This control is used within the audio program chain to provide an upper limit to peak program levels. It is sometimes referred to as a “brick-wall” limiter, as it will not allow audio to pass beyond this audio level. The value range is -15 dBFS to -1 dBFS.

### **Program IntelliGain® Threshold Minor/ Major/ Critical**

**Gain Level:** This control allows the user to set the audio loudness threshold (dBFS) that determines if the status of the *minor/major/critical* trap. If the program audio loudness level *exceeds* the program threshold for the *fault duration*, it will trigger the corresponding *minor/major/critical* fault trap to be sent to the registered trap alarm servers. If the program audio loudness level remains *below* the program threshold for the *clear duration*, it will trigger the corresponding *minor/major/critical* fault trap to be cleared. The value range is -65 dBFS to -1 dBFS.

**Fault Duration:** This control allows the user to define the amount of time that the program audio loudness level must exceed the *minor/major/critical* program threshold to trigger the corresponding *minor/major/critical* fault trap to be sent to the registered trap alarm servers. The value range is 0.5 sec to 240 sec in increments of 0.5 secs.

**Clear Duration:** This control allows the user to define the amount of time that the program audio loudness level must remain below the *minor/major/critical* program threshold to trigger the corresponding *minor/major/critical* fault trap to be cleared. This control is primarily used to smooth out alarming for audio with a very wide dynamic range. The value range is 0.5 sec to 240 sec in increments of 0.5 secs.

### **Program Monitor**

**Input Loudness:** This field displays the calculated audio input loudness level. This control is used for monitoring purposes only. The value is reported in dBFS.

**Gain Applied:** This field displays the amount of gain being applied by the IntelliGain™ system. Values can be either negative, indicating a gain reduction, or positive, indicating gain is being applied. The value is reported in dBFS.

**Output Loudness:** This field displays the program output loudness after the IntelliGain® processing. This control is used for monitoring purposes only. It can be used to provide confidence monitoring. The value is reported in dBFS.

### **Program Integrated Loudness Meter**

**Integrated Loudness:** This field will display the calculated integrated loudness audio level. This control is used for monitoring purposes only. The period of the integrated loudness measurement is defined by user interaction with the *Start/Continue* and *Stop/Pause* buttons. Once the *Stop/Pause* button is activated, the loudness of the segment(s) defined by all active periods is calculated. The integrated loudness measurement is performed using the gating function specified in *ITU-R BS.1770-2* summarized as follows:

- an absolute gating threshold at -70 LKFS is used to compute the absolute-gated loudness level
- a relative gating threshold that is 10 LU below the absolute-gated loudness level is applied
- The measurement input to which the gating threshold is applied is the loudness of 400 ms blocks with a constant overlap between consecutive gating blocks of 75%.

The value is reported in LKFS.

**Maximum Loudness:** This field displays the maximum calculated loudness value within the duration of the *Integrated Loudness* calculation. This control is used for monitoring purposes only. The value is reported in LKFS.

**Loudness Range:** This field displays the calculated loudness range within the duration of the *Integrated Loudness* calculation. The Loudness Range describes the distribution of loudness within a program and is defined as the difference between the highest and lowest loudness values within the integrated loudness period. The range excludes all loudness values in the top 5% and bottom 10% of the loudness distribution after applying a relative gating threshold of 20 LU below the absolute-gated loudness level. This control is used for monitoring purposes only. The value is reported in LU.

**Loudness Range Low:** This field displays the lowest calculated loudness value within the duration of the *Integrated Loudness* calculation, given the exclusions and thresholds used as described above in the calculation of the *Loudness Range*. This control is used for monitoring purposes only. The value is reported in LUFS

**Loudness Range High:** This field displays the highest calculated loudness value within the duration of the *Integrated Loudness* calculation, given the exclusions and thresholds used as described above in the calculation of the *Loudness Range*. This control is used for monitoring purposes only. The value is reported in LUFS

**Reset:** This control allows the user to flush the buffer for the *Integrated Loudness* calculation. This control should be activated each time a new *Integrated Loudness* value is to be obtained.

**Start/Continue:** This control allows the user to commence or resume the duration in which loudness values are being used to calculate the *Integrated Loudness* measurement.

**Stop/Pause:** This control allows the user to terminate or pause the duration in which loudness values are being used to calculate the *Integrated Loudness* measurement. Each time this button is activated, a new *Integrated Loudness* value will be produced.

#### 5.2.25.4. IntelliGain® Traps [+IG2]

The IntelliGain® audio loudness processing module can provide confidence monitoring with SNMP trap alarm notification. These alarms can be enabled and disabled on an individual audio program basis using the IntelliGain™ Traps tab.

The IntelliGain® Traps tab contains the IntelliGain® program trap enables, as well as corresponding trap status for each IntelliGain® audio program. Figure 5-38 illustrates the layout of these controls in the VistaLINK® PRO configuration view.

To enable or disable an SNMP alarm notification, either check or un-check the defined control.

The IntelliGain® audio loudness processing module also provides trap status information on the IntelliGain® traps tab. If a trap is sent by the IntelliGain™ system, the trap status box will change state indicating the current value for that trap. For example, if the trap status box is the colour green, then the trap has not been sent, and the trap is not in the alarm state. However, if the status box is the colour red, then the fault is in a current state of alarm. Once corrected, the status box will turn back to the colour green.

The screenshot displays the IntelliGain® Traps configuration interface. At the top, there is a 'Module Select' section with two radio buttons: 'Module 1' (selected) and 'Module 2'. Below this, the interface is organized into a grid of 8 columns, each representing a program (Program 1 through Program 8). Each column is divided into two sections: 'Trap Enable' and 'Trap Status'. The 'Trap Enable' section contains three checkboxes for 'Loudness Level Threshold Minor', 'Loudness Level Threshold Major', and 'Loudness Level Threshold Critical'. The 'Trap Status' section contains three green squares, each corresponding to the same threshold levels. All checkboxes are checked, and all status boxes are green.

Program	Trap Enable	Trap Status
Program 1	<input checked="" type="checkbox"/> Loudness Level Threshold Minor <input checked="" type="checkbox"/> Loudness Level Threshold Major <input checked="" type="checkbox"/> Loudness Level Threshold Critical	<div>■</div> Loudness Level Threshold Minor <div>■</div> Loudness Level Threshold Major <div>■</div> Loudness Level Threshold Critical
Program 2	<input checked="" type="checkbox"/> Loudness Level Threshold Minor <input checked="" type="checkbox"/> Loudness Level Threshold Major <input checked="" type="checkbox"/> Loudness Level Threshold Critical	<div>■</div> Loudness Level Threshold Minor <div>■</div> Loudness Level Threshold Major <div>■</div> Loudness Level Threshold Critical
Program 3	<input checked="" type="checkbox"/> Loudness Level Threshold Minor <input checked="" type="checkbox"/> Loudness Level Threshold Major <input checked="" type="checkbox"/> Loudness Level Threshold Critical	<div>■</div> Loudness Level Threshold Minor <div>■</div> Loudness Level Threshold Major <div>■</div> Loudness Level Threshold Critical
Program 4	<input checked="" type="checkbox"/> Loudness Level Threshold Minor <input checked="" type="checkbox"/> Loudness Level Threshold Major <input checked="" type="checkbox"/> Loudness Level Threshold Critical	<div>■</div> Loudness Level Threshold Minor <div>■</div> Loudness Level Threshold Major <div>■</div> Loudness Level Threshold Critical
Program 5	<input checked="" type="checkbox"/> Loudness Level Threshold Minor <input checked="" type="checkbox"/> Loudness Level Threshold Major <input checked="" type="checkbox"/> Loudness Level Threshold Critical	<div>■</div> Loudness Level Threshold Minor <div>■</div> Loudness Level Threshold Major <div>■</div> Loudness Level Threshold Critical
Program 6	<input checked="" type="checkbox"/> Loudness Level Threshold Minor <input checked="" type="checkbox"/> Loudness Level Threshold Major <input checked="" type="checkbox"/> Loudness Level Threshold Critical	<div>■</div> Loudness Level Threshold Minor <div>■</div> Loudness Level Threshold Major <div>■</div> Loudness Level Threshold Critical
Program 7	<input checked="" type="checkbox"/> Loudness Level Threshold Minor <input checked="" type="checkbox"/> Loudness Level Threshold Major <input checked="" type="checkbox"/> Loudness Level Threshold Critical	<div>■</div> Loudness Level Threshold Minor <div>■</div> Loudness Level Threshold Major <div>■</div> Loudness Level Threshold Critical
Program 8	<input checked="" type="checkbox"/> Loudness Level Threshold Minor <input checked="" type="checkbox"/> Loudness Level Threshold Major <input checked="" type="checkbox"/> Loudness Level Threshold Critical	<div>■</div> Loudness Level Threshold Minor <div>■</div> Loudness Level Threshold Major <div>■</div> Loudness Level Threshold Critical

**Figure 5-38 : Video Path Configuration - IntelliGain® Traps**



### 5.2.26. Time Code [+UDX2]

The *Time Code* control tab in the video path configuration allows the user to fully configure all time code controls related to the specific video path. The 7815VPDA with the [+UDX2] product option can fully process *D-VITC*, *ANC-VITC* or *ANC-LTC* time code and perform any necessary conversion from input video standard to the selected output video standard.

On the input video signal, time code is processed using a fixed priority of *D-VITC*, *ANC-LTC*, *ANC-VITC1*, *ANC-VITC2*. The 7815VPDA module can only process a single embedded time code from the input video signal. As such, when an output time code source is set to *Embedded*, it will search based on priority for the presence of an embedded time code. Once an embedded time code has been detected, it will then be used for all time code processing used to generate the corresponding time code for that output time code.

The user can individually configure the type of time code (*D-VITC*, *ANC-VITC* or *ANC-LTC*) to be embedded in the output video signal. Figure 5-39 illustrates the layout of the *Time Code* control tab in the VistaLINK® PRO configuration view. The *Time code processing* feature is only valid for the [+UDX2] product option.



**Figure 5-39 : Video Path Configuration - Time Code**

### Time Code Control

**D-VITC Read Line:** This control specifies the SD input video line number to be used for detection and reading of the D-VITC timecode waveform. This control only applies when the input video signal is SD (525i/59.94Hz or 625i/50Hz). The valid range is bounded by the SD input video standard VBI region. Table 5-17 shows the valid ranges for both supported SD video standards.

**D-VITC Write Line:** This control specifies the SD output video line number to be used for insertion of the D-VITC timecode waveform. This control only applies when the input video signal is SD (525i/59.94Hz or 625i/50Hz) and the *D-VITC* output control is not set to *Off*. The valid range is based on the SD input video standard VBI region. Table 5-17 shows the valid ranges for both supported SD video standards.

Video Standard	D-VITC Read/Write Line Range
525i/59.94Hz	10 to 20
625i/50Hz	6 to 22

**Table 5-17 : Time Code - D-VITC Valid Line Numbers**

**Loss of Time Code:** This control sets the behavior of the time code outputs when time code is lost/missing from the input video signal. When set to **Mute**, time code will not be embedded on the output video signal when not present on the input video signal. When set to **Hold**, the last received time code value will be embedded on the output video signal until time code presence returns on the input video signal. When set to **Run**, during a loss of input time code, the time code will continue to increment internally and this free-running time code will be embedded on the output video signal until time code presence returns on the input video signal.

**D-VITC:** This control selects the source of time code for embedding D-VITC time code on the output video signal. The D-VITC signal will be embedded on the line specified by the *D-VITC Write Line* control. This control only applies when the output video signal is SD (525i/59.94Hz or 625i/50Hz). Table 5-18 describes each possible mode of operation.

**ANC-VITC:** This control selects the source of time code for embedding ANC-VITC time code on the output video signal. Table 5-18 describes each possible mode of operation.

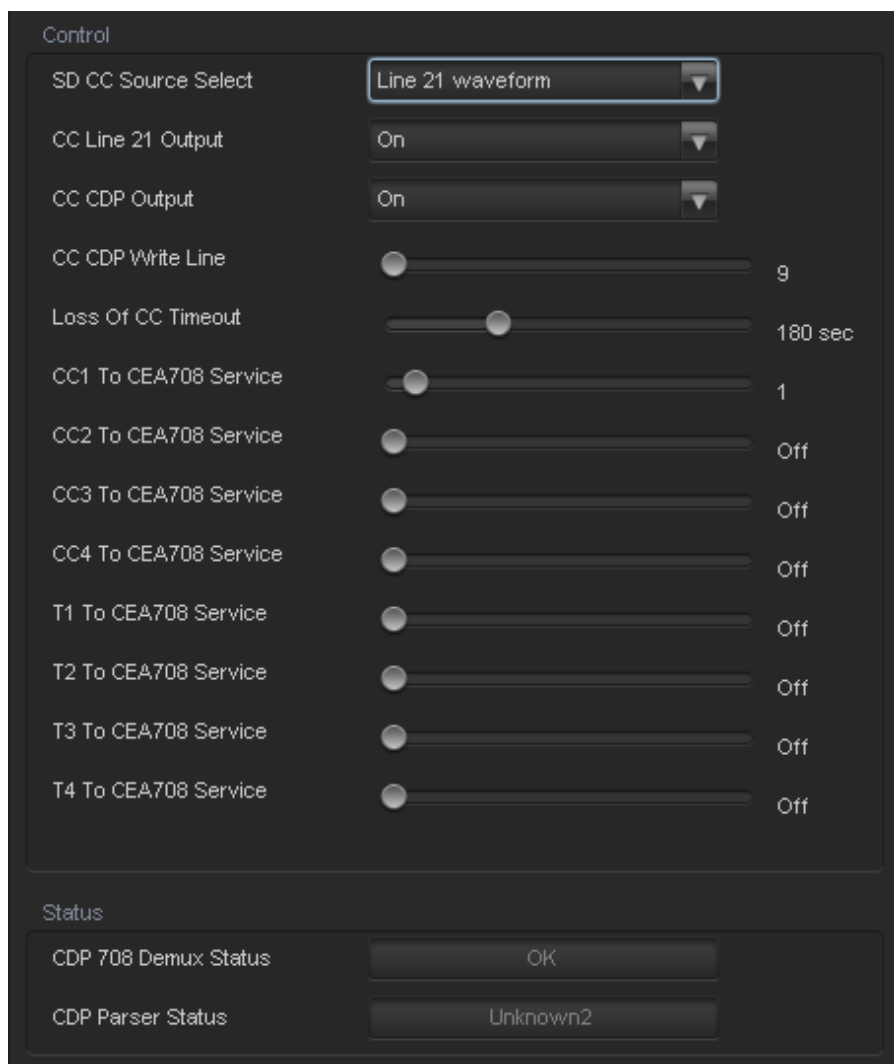
**ANC-LTC:** This control selects the source of time code for embedding ANC-LTC time code on the output video signal. Table 5-18 describes each possible mode of operation.

<b>Off</b>	Time code is not embedded on the output video signal
<b>Embedded</b>	Time code sourced from the input video signal (based on a fixed priority) and processed by the module is embedded on the output video signal
<b>System Time</b>	Time code generated based on the module's system time is embedded on the output video signal.
<b>Genlock VITC</b>	Time code sourced from the external Genlock (reference) input signal. The VITC signal is extracted from the line number specified by the <i>Genlock VITC Read Line</i> control in the <i>Global Configuration View -&gt; Reference</i> tab.

**Table 5-18 : Time Code - Modes of Operation**

### 5.2.27. Closed Captioning [+UDX2]

The *Closed Captioning* control tab in the video path configuration allows the user to fully configure all closed caption processing controls related to the specific video path. Closed caption processing can be configured independently on each video path. The 7815VPDA with the [+UDX2] product option can fully process closed caption data. This includes support for reading closed caption data embedded in the input video signal as either a digitized closed caption waveform (*SD video standards only*), or CDP packets (*SD/HD/3G video standards*) according to SMPTE 334. The module can also perform necessary translation between CEA608 and CEA708 data services when converting from SD input video to HD/3G output video. In addition to closed caption processing, the 7815VPDA also contains detailed input closed caption status information and configurable trap alarming. Figure 5-40 illustrates the layout of the *Closed Captioning* control tab in the VistaLINK® PRO configuration view. The *Closed Captioning processing* feature is only valid for the [+UDX2] product option.



Control	
SD CC Source Select	Line 21 waveform
CC Line 21 Output	On
CC CDP Output	On
CC CDP Write Line	9
Loss Of CC Timeout	180 sec
CC1 To CEA708 Service	1
CC2 To CEA708 Service	Off
CC3 To CEA708 Service	Off
CC4 To CEA708 Service	Off
T1 To CEA708 Service	Off
T2 To CEA708 Service	Off
T3 To CEA708 Service	Off
T4 To CEA708 Service	Off

Status	
CDP 708 Demux Status	OK
CDP Parser Status	Unknown2

Figure 5-40 : Video Path Configuration – Closed Captioning



**NOTE:** Changes to the closed captioning configuration can cause a momentary interruption in the closed captioning output.

**SD CC Source Select:** This control selects the source of input closed caption data for SD input video standards (525i/59.94Hz, 625i/50Hz). Since SD video standards can carry a digitized version of the legacy closed caption analog waveform (*referred to as Line 21 waveform*), and/or digital CDP data packets, the user must specify the desired source of caption data to be processed by the module. When set to **Line 21 waveform**, the closed caption data carried on the digitized closed caption analog waveform will source the closed caption processor. When set to **CDP**, the closed caption data carried in the digital CDP ANC packet will source the closed caption processor. This control only applies when the input video standard is SD (525i/59.94Hz, 625i/50Hz).

**CC Line 21 Output:** This control enables or disables embedding the digitized version of the legacy closed caption analog waveform (*referred to as Line 21 waveform*) on the output video standard. The closed caption waveform is only embedded when the output video standard is SD (525i/59.94Hz, 625i/50Hz). This control only applies when the output video standard is SD (525i/59.94Hz, 625i/50Hz).

**CC CDP Output:** This control enables or disables embedding the digital CDP ANC packet on the output video standard. The digital CDP packet will be embedded in the VANC region on the line number specified by the **CC CDP Write Line** control. This control is valid for all output video standards.

**CC CDP Write Line:** This control sets the output line number of the CDP ANC packet to be embedded in the VANC region. The range is from 2 lines past the designated switching line to the last line of the VANC region. Thus, the actual numeric range is video standard dependent.

**Loss of CC Timeout:** This control sets the number of seconds that CC input data must be missing from the input video signal before triggering CC data service loss status and traps. The value range is 1 to 600 seconds.

### **Caption Service Translation**

There are eight controls that allow the user to define CEA608 (CC1-4, T1-4) to CEA708 (Services 1-16) caption service translation. Each control specifies the translation of one of the 8 supported CEA608 caption services to one of the 16 supported CEA708 caption services. When set to **off**, no translation is performed for that particular CEA608 service.



**NOTE:** All caption service translations will overwrite the corresponding CEA708 service data if it is already present on within the input closed caption data.

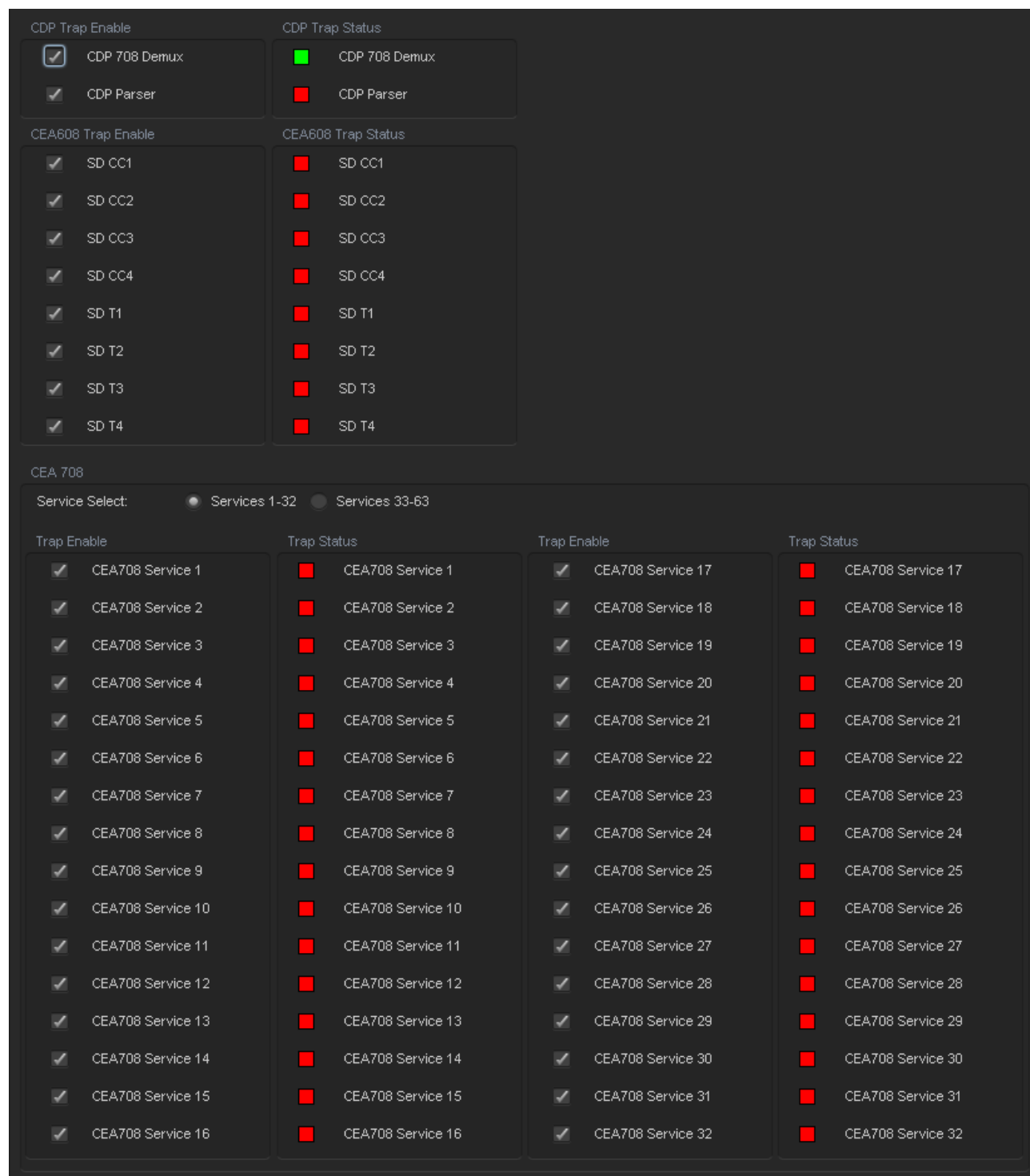
### **Closed Captioning Status**

**CDP 708 Demux Status:** This control reports the current status of input CDP 708 demultiplexing processing. It will report any errors the closed caption processor is experiencing while demultiplexing the input CDP 708 data.

**CDP Parser Status:** This control reports the current status of input CDP 708 parser processing. It will report any errors the closed caption processor is experiencing while parsing the input CDP 708 data.

### 5.2.28. Closed Captioning Traps [+UDX2]

The *Closed Captioning Traps* control tab in the video path configuration allows the user to view closed captioning input status for trap alarms, and to enable / disable corresponding trap alarming. Figure 5-41 illustrates the layout of the *Closed Captioning Traps* control tab in the VistaLINK® PRO configuration view. The *Closed Captioning processing* feature is only valid for the [+UDX2] product option.



CDP Trap Enable		CDP Trap Status	
<input checked="" type="checkbox"/> CDP 708 Demux	<input checked="" type="checkbox"/> CDP 708 Demux	<input checked="" type="checkbox"/> CDP 708 Demux	<input checked="" type="checkbox"/> CDP 708 Demux
<input checked="" type="checkbox"/> CDP Parser	<input checked="" type="checkbox"/> CDP Parser	<input checked="" type="checkbox"/> CDP Parser	<input checked="" type="checkbox"/> CDP Parser

CEA608 Trap Enable		CEA608 Trap Status	
<input checked="" type="checkbox"/> SD CC1	<input checked="" type="checkbox"/> SD CC1	<input checked="" type="checkbox"/> SD CC1	<input checked="" type="checkbox"/> SD CC1
<input checked="" type="checkbox"/> SD CC2	<input checked="" type="checkbox"/> SD CC2	<input checked="" type="checkbox"/> SD CC2	<input checked="" type="checkbox"/> SD CC2
<input checked="" type="checkbox"/> SD CC3	<input checked="" type="checkbox"/> SD CC3	<input checked="" type="checkbox"/> SD CC3	<input checked="" type="checkbox"/> SD CC3
<input checked="" type="checkbox"/> SD CC4	<input checked="" type="checkbox"/> SD CC4	<input checked="" type="checkbox"/> SD CC4	<input checked="" type="checkbox"/> SD CC4
<input checked="" type="checkbox"/> SD T1	<input checked="" type="checkbox"/> SD T1	<input checked="" type="checkbox"/> SD T1	<input checked="" type="checkbox"/> SD T1
<input checked="" type="checkbox"/> SD T2	<input checked="" type="checkbox"/> SD T2	<input checked="" type="checkbox"/> SD T2	<input checked="" type="checkbox"/> SD T2
<input checked="" type="checkbox"/> SD T3	<input checked="" type="checkbox"/> SD T3	<input checked="" type="checkbox"/> SD T3	<input checked="" type="checkbox"/> SD T3
<input checked="" type="checkbox"/> SD T4	<input checked="" type="checkbox"/> SD T4	<input checked="" type="checkbox"/> SD T4	<input checked="" type="checkbox"/> SD T4

CEA 708

Service Select: ☒ Services 1-32 ☐ Services 33-63

Trap Enable		Trap Status		Trap Enable		Trap Status	
<input checked="" type="checkbox"/> CEA708 Service 1	<input checked="" type="checkbox"/> CEA708 Service 1	<input checked="" type="checkbox"/> CEA708 Service 1	<input checked="" type="checkbox"/> CEA708 Service 1	<input checked="" type="checkbox"/> CEA708 Service 17	<input checked="" type="checkbox"/> CEA708 Service 17	<input checked="" type="checkbox"/> CEA708 Service 17	<input checked="" type="checkbox"/> CEA708 Service 17
<input checked="" type="checkbox"/> CEA708 Service 2	<input checked="" type="checkbox"/> CEA708 Service 2	<input checked="" type="checkbox"/> CEA708 Service 2	<input checked="" type="checkbox"/> CEA708 Service 2	<input checked="" type="checkbox"/> CEA708 Service 18	<input checked="" type="checkbox"/> CEA708 Service 18	<input checked="" type="checkbox"/> CEA708 Service 18	<input checked="" type="checkbox"/> CEA708 Service 18
<input checked="" type="checkbox"/> CEA708 Service 3	<input checked="" type="checkbox"/> CEA708 Service 3	<input checked="" type="checkbox"/> CEA708 Service 3	<input checked="" type="checkbox"/> CEA708 Service 3	<input checked="" type="checkbox"/> CEA708 Service 19	<input checked="" type="checkbox"/> CEA708 Service 19	<input checked="" type="checkbox"/> CEA708 Service 19	<input checked="" type="checkbox"/> CEA708 Service 19
<input checked="" type="checkbox"/> CEA708 Service 4	<input checked="" type="checkbox"/> CEA708 Service 4	<input checked="" type="checkbox"/> CEA708 Service 4	<input checked="" type="checkbox"/> CEA708 Service 4	<input checked="" type="checkbox"/> CEA708 Service 20	<input checked="" type="checkbox"/> CEA708 Service 20	<input checked="" type="checkbox"/> CEA708 Service 20	<input checked="" type="checkbox"/> CEA708 Service 20
<input checked="" type="checkbox"/> CEA708 Service 5	<input checked="" type="checkbox"/> CEA708 Service 5	<input checked="" type="checkbox"/> CEA708 Service 5	<input checked="" type="checkbox"/> CEA708 Service 5	<input checked="" type="checkbox"/> CEA708 Service 21	<input checked="" type="checkbox"/> CEA708 Service 21	<input checked="" type="checkbox"/> CEA708 Service 21	<input checked="" type="checkbox"/> CEA708 Service 21
<input checked="" type="checkbox"/> CEA708 Service 6	<input checked="" type="checkbox"/> CEA708 Service 6	<input checked="" type="checkbox"/> CEA708 Service 6	<input checked="" type="checkbox"/> CEA708 Service 6	<input checked="" type="checkbox"/> CEA708 Service 22	<input checked="" type="checkbox"/> CEA708 Service 22	<input checked="" type="checkbox"/> CEA708 Service 22	<input checked="" type="checkbox"/> CEA708 Service 22
<input checked="" type="checkbox"/> CEA708 Service 7	<input checked="" type="checkbox"/> CEA708 Service 7	<input checked="" type="checkbox"/> CEA708 Service 7	<input checked="" type="checkbox"/> CEA708 Service 7	<input checked="" type="checkbox"/> CEA708 Service 23	<input checked="" type="checkbox"/> CEA708 Service 23	<input checked="" type="checkbox"/> CEA708 Service 23	<input checked="" type="checkbox"/> CEA708 Service 23
<input checked="" type="checkbox"/> CEA708 Service 8	<input checked="" type="checkbox"/> CEA708 Service 8	<input checked="" type="checkbox"/> CEA708 Service 8	<input checked="" type="checkbox"/> CEA708 Service 8	<input checked="" type="checkbox"/> CEA708 Service 24	<input checked="" type="checkbox"/> CEA708 Service 24	<input checked="" type="checkbox"/> CEA708 Service 24	<input checked="" type="checkbox"/> CEA708 Service 24
<input checked="" type="checkbox"/> CEA708 Service 9	<input checked="" type="checkbox"/> CEA708 Service 9	<input checked="" type="checkbox"/> CEA708 Service 9	<input checked="" type="checkbox"/> CEA708 Service 9	<input checked="" type="checkbox"/> CEA708 Service 25	<input checked="" type="checkbox"/> CEA708 Service 25	<input checked="" type="checkbox"/> CEA708 Service 25	<input checked="" type="checkbox"/> CEA708 Service 25
<input checked="" type="checkbox"/> CEA708 Service 10	<input checked="" type="checkbox"/> CEA708 Service 10	<input checked="" type="checkbox"/> CEA708 Service 10	<input checked="" type="checkbox"/> CEA708 Service 10	<input checked="" type="checkbox"/> CEA708 Service 26	<input checked="" type="checkbox"/> CEA708 Service 26	<input checked="" type="checkbox"/> CEA708 Service 26	<input checked="" type="checkbox"/> CEA708 Service 26
<input checked="" type="checkbox"/> CEA708 Service 11	<input checked="" type="checkbox"/> CEA708 Service 11	<input checked="" type="checkbox"/> CEA708 Service 11	<input checked="" type="checkbox"/> CEA708 Service 11	<input checked="" type="checkbox"/> CEA708 Service 27	<input checked="" type="checkbox"/> CEA708 Service 27	<input checked="" type="checkbox"/> CEA708 Service 27	<input checked="" type="checkbox"/> CEA708 Service 27
<input checked="" type="checkbox"/> CEA708 Service 12	<input checked="" type="checkbox"/> CEA708 Service 12	<input checked="" type="checkbox"/> CEA708 Service 12	<input checked="" type="checkbox"/> CEA708 Service 12	<input checked="" type="checkbox"/> CEA708 Service 28	<input checked="" type="checkbox"/> CEA708 Service 28	<input checked="" type="checkbox"/> CEA708 Service 28	<input checked="" type="checkbox"/> CEA708 Service 28
<input checked="" type="checkbox"/> CEA708 Service 13	<input checked="" type="checkbox"/> CEA708 Service 13	<input checked="" type="checkbox"/> CEA708 Service 13	<input checked="" type="checkbox"/> CEA708 Service 13	<input checked="" type="checkbox"/> CEA708 Service 29	<input checked="" type="checkbox"/> CEA708 Service 29	<input checked="" type="checkbox"/> CEA708 Service 29	<input checked="" type="checkbox"/> CEA708 Service 29
<input checked="" type="checkbox"/> CEA708 Service 14	<input checked="" type="checkbox"/> CEA708 Service 14	<input checked="" type="checkbox"/> CEA708 Service 14	<input checked="" type="checkbox"/> CEA708 Service 14	<input checked="" type="checkbox"/> CEA708 Service 30	<input checked="" type="checkbox"/> CEA708 Service 30	<input checked="" type="checkbox"/> CEA708 Service 30	<input checked="" type="checkbox"/> CEA708 Service 30
<input checked="" type="checkbox"/> CEA708 Service 15	<input checked="" type="checkbox"/> CEA708 Service 15	<input checked="" type="checkbox"/> CEA708 Service 15	<input checked="" type="checkbox"/> CEA708 Service 15	<input checked="" type="checkbox"/> CEA708 Service 31	<input checked="" type="checkbox"/> CEA708 Service 31	<input checked="" type="checkbox"/> CEA708 Service 31	<input checked="" type="checkbox"/> CEA708 Service 31
<input checked="" type="checkbox"/> CEA708 Service 16	<input checked="" type="checkbox"/> CEA708 Service 16	<input checked="" type="checkbox"/> CEA708 Service 16	<input checked="" type="checkbox"/> CEA708 Service 16	<input checked="" type="checkbox"/> CEA708 Service 32	<input checked="" type="checkbox"/> CEA708 Service 32	<input checked="" type="checkbox"/> CEA708 Service 32	<input checked="" type="checkbox"/> CEA708 Service 32

**Figure 5-41 : Video Path Configuration - CC Fault**

### CDP Traps

**CDP 708 Demux:** This trap is triggered when errors are detected during input CDP 708 demultiplexing processing.

**CDP Parser:** This trap is triggered when errors are detected during input CDP 708 parser processing.

### CEA608 Traps

**SD CC1-4:** These traps are triggered when the corresponding CEA608 CC [1-4] service is lost/missing from the input closed caption data.

**SD T1-4:** These traps are triggered when the corresponding CEA608 T [1-4] service is lost/missing from the input closed caption data.

### CEA708 Traps

**CEA708 Service 1-63:** These traps are triggered when the corresponding CEA708 service [1-63] is lost/missing from the input closed caption data.

### 5.2.29. SID (Source Identification)

Source Identification (*termed Source ID*) provides a useful method for tagging the video signal with a VANC data packet as it is processed by the module. With each module appending its own source ID tag into the VANC region; it effectively creates a history of the signal processing path taken by any video signal through the facility.

Each source ID tag VANC packet payload is 113 bytes and is defined as follows:

Element	Bytes
Version	1
SID Count & Overflow	2
Date (DDMMYY)	6
Time (HHMMSSFF)	8
Time Zone	4
Base Label	16
Alias Label	48
User Code	4
Alpha Tag	12
Serial Tag	12
<b>Total Payload per SID tag</b>	<b>113</b>

**Table 5-19 : Source ID - VANC Packet Payload**

All data within the source ID packet is ASCII encoded to allow for simple decoding and monitoring of any element within the source ID packet.

The SID tab contains all controls relating to Source ID processing. It allows the user to specify the contents of the source ID VANC packet that will uniquely identify the module and act as its *fingerprint/signature* on the processed video signal. It also reports the other components of the source ID tag that are not user configurable. Figure 5-42 illustrates the layout of these controls in the VistaLINK<sup>®</sup> PRO configuration view. The specific functionality of each control is provided below.

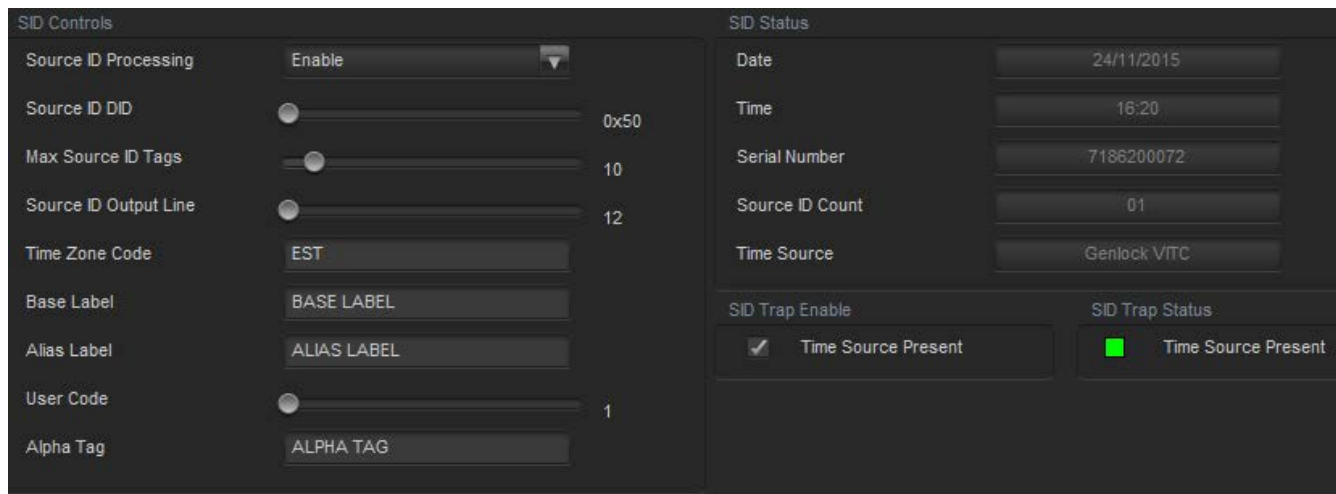


Figure 5-42 : Video Path Configuration - SID

### SID Controls

**Source ID Processing:** This control allows the user to enable Source ID Processing. When set to **Enable**, all Source ID tags on the input are processed and embedded on the output video signal. Additionally, the module will also append its own Source ID tag. When set to **Disable**, no input Source ID packets will be processed, and the module will not append its own Source ID tag on the output video signal.

**Source ID DID:** This control allows the user to set the Data Identification (DID) value for the Source ID SMPTE-291 packets.

**Max Source ID Tags:** This control allows the user to set the maximum number of Source ID tags to be processed and embedded on the output video signal.



**NOTE:** Care must be taken to properly restrict the number of Source ID packets to ensure they won't exceed the number of bytes per VANC line of the output video standard.

**Source ID Output Line:** This control allows the user to set the VANC output line to embed the Source ID packets.

**Time Zone:** This field allows the user to set the Time Zone Code for its Source ID tag. The Time Zone is a maximum of 4 characters.

**Base Label:** This field allows the user to set the primary identification of the module/video signal. The base label is a maximum of 16 characters.

**Alias Label:** This field allows the user to set additional secondary identification of the module/video signal. The alias label is 48 characters and can be used for a more detailed description of the module/video signal.

**User Code:** This field allows the user to set a 4 digit utility number available for user monitoring applications of Source ID. One possible use case would be to set the user code as the router input / output number. The value range is 0000 – 9999.

**Alpha Tag:** This field allows the user to set a 12 character identification of the module owner.

### SID Status

**Date:** This field reports the current system date of the module that will be embedded in the 6 character **Date** field of the Source ID tag.

**Time:** This field reports the current system time of the module that will be embedded in the 8 character **Time** field of the Source ID tag.

**Serial Number:** This field reports the Serial number of the card that will be embedded in the 12 character **Serial Tag** field of the Source ID tag.

**Source ID Count:** This field reports the Source ID count that will be embedded in the 2 character **SID Count & Overflow** field of the Source ID tag.

**Time Source:** This field reports the current source of time used by the *Time* and *Date* fields in the Source ID tag.

### Trap Enable and Trap Status

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

**Time Source Present:** This trap will **trigger** when the module detects a loss of the Source ID time source. This trap will **clear** when a valid source of time has been detected.

### 5.2.30. ANC PassThru

The ANC PassThru feature allows for the user to define specific rules for passing ANC data from input to output. There are two modes of operation for ANC PassThru: **Direct ANC PassThru** and **Mapped ANC PassThru**.

The **Direct ANC PassThru** mode of operation routes *ALL* ancillary data in both HANC & VANC frame accurately from input to output. This mode of operation is designed for the use case when the input video standard and output video standard are identical.

Additionally, Direct ANC PassThru will also support passing SD-VBI waveforms from input to output.

All packets that are processed by the module itself (For example: Source ID) are safely blocked from passing from input to output while operating in Direct ANC PassThru.

#### **Key Functional Notes of Direct ANC PassThru:**

- Only supported when Input Video Standard is identical to the Output Video Standard
- **Direct ANC PassThru** overrides **Mapped ANC PassThru** when it is enabled and Input Video Standard is identical to the Output Video Standard
- When **Direct ANC PassThru** is disabled or invalid, **Mapped ANC PassThru** rules are applied.
- Supports SD-VBI waveform pass through for SD video.
- ANC packets processed by the system (*For example: Source ID*) will be blocked from passing through to avoid duplicate entries on the output video.

The **Mapped ANC PassThru** mode of operation routes up to 10 unique (DID, SDID) ANC packets frame accurately from input to output. This mode of operation is designed for the use case when the



input video standard and output video standard differ, or when only a subset of the ANC data on the input is desired to be passed through the module.

The Mapped ANC PassThru provides a parameter set to fully define how each ANC packet will be routed from input to output. This includes Packet Location (HANC or VANC), output line numbers and interlaced to progressive and progressive to interlaced ANC data mapping.

**Key Functional Notes of Mapped ANC PassThru:**

- Supported for all valid input and output video standard combinations.
- When enabled and valid, **Direct ANC PassThru** overrides **Mapped ANC PassThru**.
- ANC packets processed by the system (*For example: Source ID*) will be blocked from passing through using **Mapped ANC PassThru** to avoid duplicate entries on the output video.



**NOTE:** If the module is current processing the selected DID, SDID then the **Mapped ANC Packet PassThru Status** will report *blocked*.

The ANC PassThru tab contains all controls relating to ANC pass through processing. Figure 5-43 illustrates the layout of these controls in the VistaLINK<sup>®</sup> PRO configuration view. The specific functionality of each control is provided below.

Figure 5-43 : Video Path Configuration - ANC PassThru

### Direct ANC PassThru

**Direct ANC PassThru:** This control allows the user to **Enable** or **Disable** Direct ANC data passthru for ANC data that is not processed through the module to pass through without getting striped on the output video signal.



**NOTE:** Direct AND PassThru is only functional when input and output video standards are identical.

### Mapped ANC PassThru

**ANC Index Select:** This control allows the user to select which of the 10 **Mapped ANC PassThru** rules to configure. Each **Mapped ANC PassThru** rule contains its own unique set of control values.

## ANC PassThru

**Mapped ANC Packet PassThru:** This control allows the user to enable / disable the **Mapped ANC PassThru** rule as defined by its controls. When set to **Enable** the **Mapped ANC PassThru** rule will be applied to route any ANC packets on the input with matching DID and SDID (*if relevant*) to the ANC of the output video. When set to **Disable**, the rule will not be applied, and all ANC packets on the input with matching DID and SDID (*if relevant*) will not be included in the ANC of the output video.

**DID:** This control allows the user to set the DID of the ANC packet to be passed through. Valid range is 0x01 to 0xFF.

**SDID:** This control allows the use to set the SDID of the ANC packet to be passed through. Valid range is 0x01 to 0xFF.

**Packet Location:** This control allows the user to specify whether the output ANC packet should be located in the HANC or VANC region. By selecting **VANC**, the incoming packets will be inserted on the VANC region of the output video. By selecting **HANC**, the incoming ANC packets will be inserted on the HANC region of the output video.

**Field 1 Output Line:** This control allows the user to set the field 1 output line of the ANC packet to be passed through. The valid range is video standard dependent.

**Field 2 Output Line:** This control allows the user to set the field 2 output line of the ANC packet to be passed through. This control is only valid for interlaced output video standards. The valid range is video standard dependent.

**Interlaced to Progressive Conversion Mode:** This control allows the user to determine the method of outputting the ANC packets on an interlaced to progressive conversion. By selecting **Pass Through**, the module will take an ANC packet from input field 1 and insert it onto output progressive frame 1 and an ANC packet from input field 2 and insert it onto output progressive frame 2. By selecting **Duplicate Packet**, the module will embed data from input field 1 onto both frame 1 & 2 on the output.

**Progressive to Interlaced Conversion Mode:** This control allows the user to determine the method of outputting the ANC packets on a progressive to interlaced conversion. By selecting **Pass Through**, the module will take an ANC packet from input progressive frame 1 and insert it onto output field 1, and an ANC packet from input progressive frame 2 and insert it onto output field 2. By selecting **Duplicate Packet**, the module will embed data from input progressive frame 1 onto both output field 1 & 2. By selecting **Field 1 Only**, the module will only embed the incoming ANC packets onto output field 1. By selecting **Field 2 Only**, the module will only embed the incoming ANC packets onto output field 2.

**Mapped ANC Packet Pass Through Status:** This field reports the current state of the ANC Packet PassThru rule. The possible reported status values are:

Disabled	The ANC PassThru rule is currently <b>Disabled</b>
Not Detected	The ANC packet with corresponding DID and SDID ( <i>if relevant</i> ) is <b>not detected</b> on the input video
Processing	The ANC packet with corresponding DID and SDID ( <i>if relevant</i> ) is present on the input and actively being <b>processed</b> according to the defined ANC PassThru rule
Blocked	The ANC packet with corresponding DID and SDID ( <i>if relevant</i> ) is present on the input and is being <b>blocked</b> from ANC PassThru processing because that same DID and SDID is being processed by another component of the module ( <i>For example: Source ID</i> )

**Table 5-20 : ANC PassThru - Mapped ANC Packet Pass Through Status Values**

### 5.2.31. WST OP42/47

The teletext (WST) processing feature provides the ability to read & write teletext data on SD video (625i/50Hz) using the OP42 transmission specification, as well as on SD/HD/3G video (625i/50Hz, 1080i/50Hz, 720p/50Hz, 1080p/50Hz) using the OP47 specification. The OP42 specification is based on the ETSI EN 300 706 Enhanced Teletext Specification, while the OP47 specification is based on the SMPTE-291 Specification.

The feature allows for full user control of the conversion of OP42 input signals (SD) to OP47 output signals (HD) and vice versa to seamlessly support the flow of teletext data from input to output during an up-conversion or down-conversion process.

The feature supports reading and writing up to 5 independent teletext streams. For SD video, this involves using 5 independent VANC lines to receive/transmit the teletext waveform as specified in OP 42. For HD video, up to 5 independent teletext streams can be embedded into a single *subtitling distribution packet (SDP)* as specified in OP47. The flexible user control allows for a selection of any number of the input WST streams present on the input video to be routed to the output video signal.

Both continuous mode operation, including *dummy packet insertion & clear-downs*, and double transmission are supported as described in the OP42 specification.

The feature also includes error checking of both OP42 teletext waveforms (*Hamming code bit errors, data length errors, parity errors*) and OP47 subtitling distribution packets (*identifier errors, format code errors, packet length errors, footer ID errors, sequence count errors, checksum errors*). When an error is detected on an input signal, the corresponding trap alarm is triggered for notification and logging of the error condition.



**NOTE:** The teletext data streams are still transmitted from input to output when errors are detected. The WST data streams are only monitored, and are not modified during the translation process.

Figure 5-44 illustrates the layout of the controls in the VistaLINK<sup>®</sup> PRO configuration view.

WST Input Control

Input WST		Line Number	Status
WST 1	<input type="radio"/> Disable <input type="radio"/> Enable	<div></div> 14	WST disabled
WST 2	<input type="radio"/> Disable <input type="radio"/> Enable	<div></div> 15	WST disabled
WST 3	<input type="radio"/> Disable <input type="radio"/> Enable	<div></div> 16	WST disabled
WST 4	<input type="radio"/> Disable <input type="radio"/> Enable	<div></div> 17	WST disabled
WST 5	<input type="radio"/> Disable <input type="radio"/> Enable	<div></div> 18	WST disabled
SDP	<input type="radio"/> Disable <input type="radio"/> Enable		SDP disabled

WST Output Control

Output WST	Line Number	Continuous Mode	Double Transmission
WST 1	<div></div> 14	<input type="radio"/> Disable <input type="radio"/> Enable	<input type="radio"/> Disable <input type="radio"/> Enable
WST 2	<div></div> 15	<input type="radio"/> Disable <input type="radio"/> Enable	<input type="radio"/> Disable <input type="radio"/> Enable
WST 3	<div></div> 16	<input type="radio"/> Disable <input type="radio"/> Enable	<input type="radio"/> Disable <input type="radio"/> Enable
WST 4	<div></div> 17	<input type="radio"/> Disable <input type="radio"/> Enable	<input type="radio"/> Disable <input type="radio"/> Enable
WST 5	<div></div> 18	<input type="radio"/> Disable <input type="radio"/> Enable	<input type="radio"/> Disable <input type="radio"/> Enable
SDP	<div></div> 12		

WST Traps

Trap	Enable	Status
WST 1 Data Error	<input checked="" type="checkbox"/>	<div></div>
WST 2 Data Error	<input checked="" type="checkbox"/>	<div></div>
WST 3 Data Error	<input checked="" type="checkbox"/>	<div></div>
WST 4 Data Error	<input checked="" type="checkbox"/>	<div></div>
WST 5 Data Error	<input checked="" type="checkbox"/>	<div></div>
SDP Data Error	<input checked="" type="checkbox"/>	<div></div>

**Figure 5-44 : Video Path Configuration - WST OP42/47**

### **WST Input Controls**

**WST <1-5> Input Enable:** This control *enables/disables* the WST input processing for the corresponding WST input stream. This control applies only for 625i/50Hz (SD) input video signals.

**WST <1-5> Input Line Number:** This control specifies the VANC line number where the input WST waveform to be processed is located. This control applies only for 625i/50Hz (SD) input video signals.

**WST <1-5> Input Status:** Reports the current status of the WST input processing (*WST disabled, WST present, WST present with errors, WST not detected*)

**SDP Input Enable:** This control *enables/disables* SDP input packet processing. When enabled, the module will search for an SDP packet (*DID=0x43, SDID=0x02*) on all input video VANC lines and ingest the packet into the WST processing pipeline if detected.

**SDP Input Status:** Reports the current status of the SDP input processing (*SDP disabled, SDP present, SDP ID error, SDP format code error, SDP data length error, SDP footer ID error, SDP sequence count error, SDP checksum error, SDP not detected*)

### **WST Output Controls**

**WST <1-5> Output Enable:** This control *enables/disables* the WST output processing for the corresponding WST output stream. This control applies only for 625i/50Hz (SD) output video signals.

**WST <1-5> Output Line Number:** This control specifies VANC line number where the WST waveform will be inserted on the output video signal. This control applies only for 625i/50Hz (SD) output video signals.

**WST <1-5> Continuous Mode:** This control *enables/disables* continuous mode operation on the corresponding output WST waveform that is inserted on the output video signal. Continuous mode ensures the WST waveform is always present on the output video signal. When no valid WST data is ready for output, the module will insert a *dummy packet* on the output video signal. Use this mode if downstream equipment expects the WST waveform to always be present on the video signal.

**WST <1-5> Double Transmission:** This control *enables/disables* repeated transmission on the WST output waveform. When enabled, the WST data is repeated when the next output field / frame of video does not contain new WST data for transmission.

**SDP Output Enable:** This control *enables/disables* SDP output processing. When enabled, the module will embed an SDP packet on the line specified by the *SDP Output Line Number* control.

**SDP Output Line Number:** This control specifies VANC line number where the SDP packet will be inserted on the output video signal.

### **Trap Enable and Trap Status**

To enable/disable a specific fault trap, check/uncheck the corresponding checkbox.

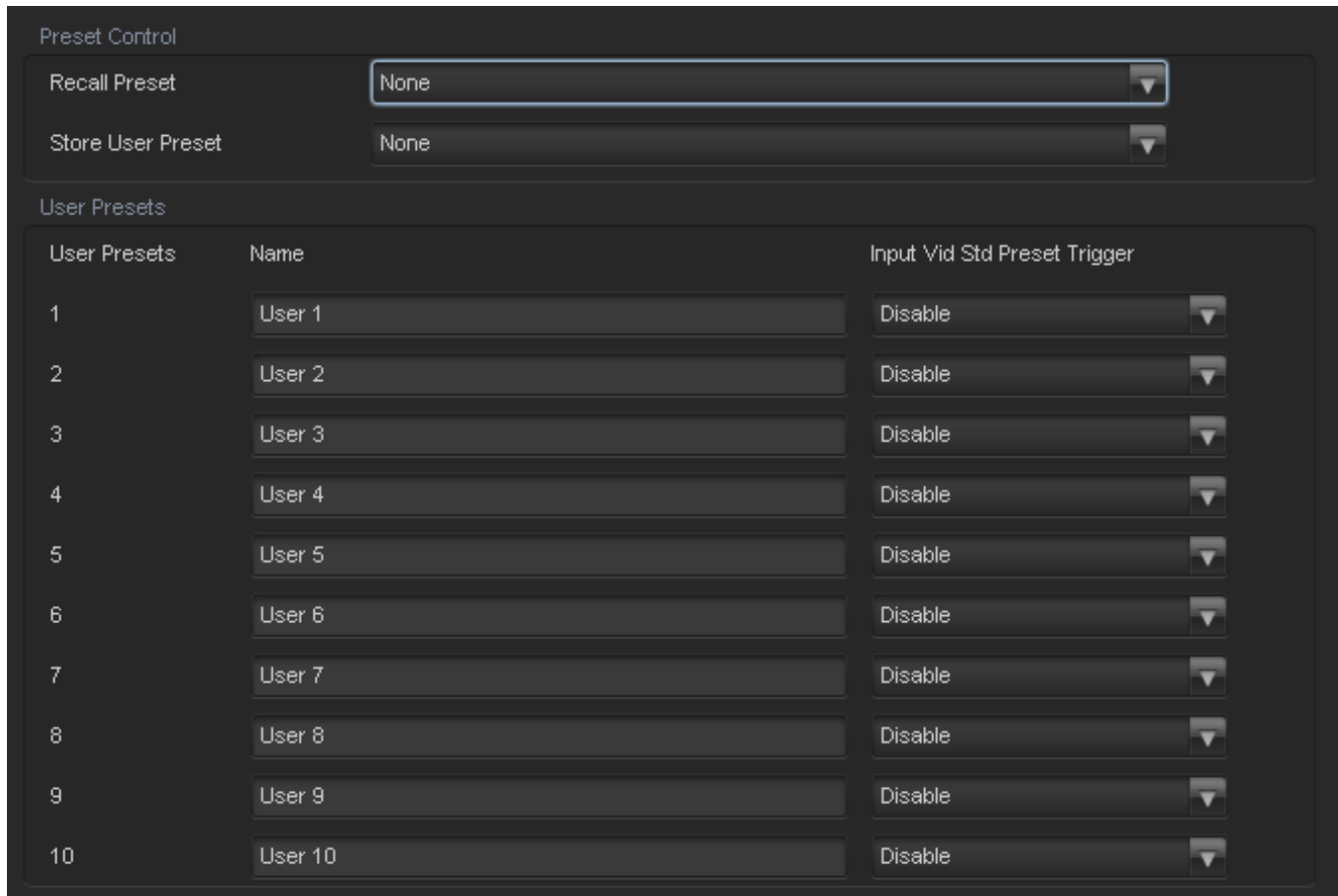
**WST <1-5> Data Error:** This trap will **trigger** when an error is detected in the corresponding input WST data stream. This trap will **clear** when valid (*error-free*) data is detected in the input WST data stream. The detectable WST errors include Hamming code bit errors, data length errors, and parity errors.

**SDP Data Error:** This trap will **trigger** when an error is detected in the corresponding input SDP packet data. This trap will **clear** when valid (*error-free*) data is detected in the input SDP packet data. The detectable SDP errors include identifier errors, format code errors, packet length errors, footer ID errors, sequence count errors, and checksum errors.

### 5.2.32. Presets

The *Presets Control* tab is used to control the presets. The user can configure the *Recall Preset*, *Store User Preset*, and enable/disable the *Auto Recall Presets* function. This Tab also allows for uploading Sub-Preset files to the module through FTP or SNMP. Sub-Preset files can be loaded one at a time or all at once using the Sub-Preset multiple load function.

Figure 5-45 illustrates the layout of these controls in the VistaLINK® PRO configuration view.



Preset Control	
Recall Preset	None
Store User Preset	None

User Presets		
User Presets	Name	Input Vid Std Preset Trigger
1	User 1	Disable
2	User 2	Disable
3	User 3	Disable
4	User 4	Disable
5	User 5	Disable
6	User 6	Disable
7	User 7	Disable
8	User 8	Disable
9	User 9	Disable
10	User 10	Disable

**Figure 5-45 : Video Path Configuration - Presets**

#### Preset Control

**Recall Preset:** This control allows the user to initiate a recall of the card configuration from one of the 10 available user presets, reset the card to factory defaults or recall one of the factory presets for standard ARC configurations.

**Store User Preset:** This control is used to initiate a store of the current card video path configuration into one of the 10 available user presets. To store a card configuration to a specific preset, select the preset to which you wish to store the card settings and press the APPLY button.

## User Presets

**Name:** This control allows the user to provide a meaningful name to each user preset. For example, rather than simply using **User 1**, the user preset can take on a name such as **1080i/59.94 In to 525i/59.94 Out**.

**Input Vid Std Preset Trigger:** This control allows the user to automatically trigger the loading of a video path user preset based on the detected input video standard. For each video path user preset, the following are the selectable options:

<b>Disable</b>	Input video standard preset triggering is <b>disabled</b> .
<b>1080i/59.94</b>	When <b>1080i/59.94</b> input video is detected, recall the user preset.
<b>720p/59.94</b>	When <b>720p/59.94</b> input video is detected, recall the user preset.
<b>525i/59.94</b>	When <b>525i/59.94</b> input video is detected, recall the user preset.
<b>1080i/50</b>	When <b>1080i/50</b> input video is detected, recall the user preset.
<b>720p/50</b>	When <b>720p/50</b> input video is detected, recall the user preset.
<b>625i/50</b>	When <b>625i/50</b> input video is detected, recall the user preset.
<b>1080p/59.94 (425M Level A)</b>	When <b>1080p/59.94 (425M Level A)</b> input video is detected, recall the user preset.
<b>1080p/59.94 (425M Level B)</b>	When <b>1080p/59.94 (425M Level B)</b> input video is detected, recall the user preset.
<b>1080p/50 (425M Level A)</b>	When <b>1080p/50 (425M Level A)</b> input video is detected, recall the user preset.
<b>1080p/50 (425M Level B)</b>	When <b>1080p/50 (425M Level B)</b> input video is detected, recall the user preset.

**Table 5-21 : Presets - Input Video Standard Preset Triggers**



### 5.2.33. SubPresets

Sub-presets provide the user the facility to load a subset of the video path configuration controls into a user preset. In most cases, there is only a small subset of the hundreds of configurable parameters that need to be changed for a user's required modes of operation of the module. By loading a sub-preset, the system will only apply the preset value for the specified parameters. This drastically reduces the system load, and significantly improves response time to a preset load. For these reasons, sub-presets are highly recommended over user presets which store all video path parameters.

A sub-preset configuration XML file must be first generated in VistaLINK® PRO. Once the XML configuration file has been generated, it can be loaded through the facilities of the SubPresets tab in the video path configuration view. Figure 5-46 illustrates the layout of these controls in the VistaLINK® PRO configuration view.

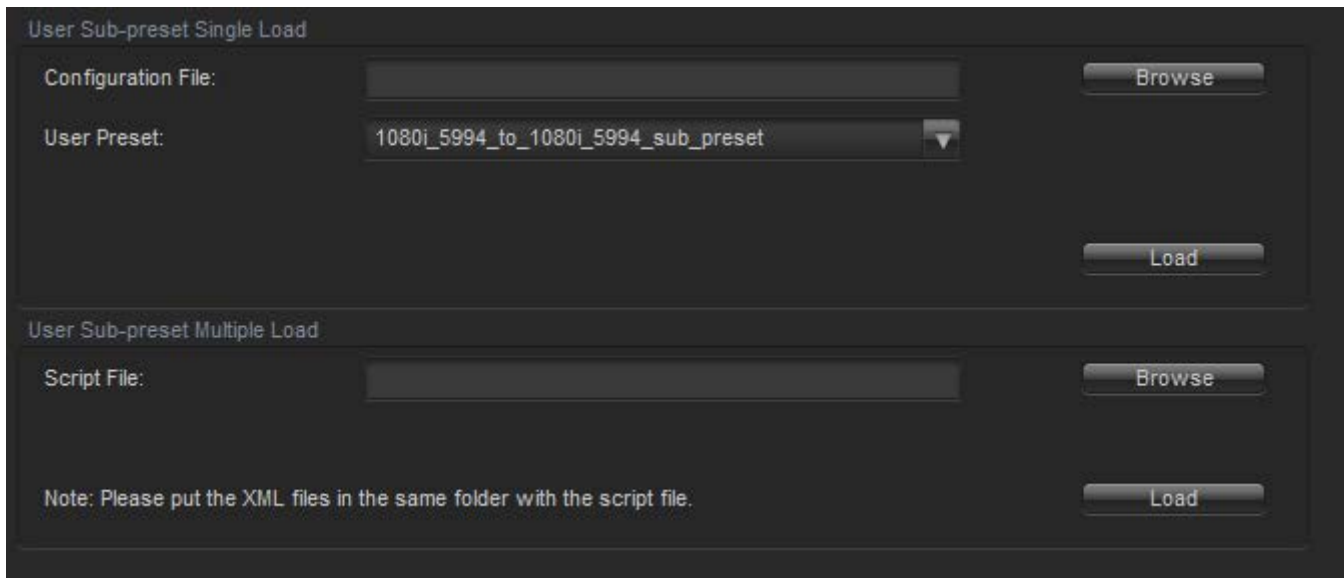


Figure 5-46 : Video Path Configuration - SubPresets

#### User Sub-preset Single Load

These controls provide the facilities to load a single sub-preset XML configuration file into a video path user preset.

**Configuration File:** By clicking the **Browse** button, the user can locate the sub-preset XML configuration file to be loaded.

**User Preset:** This control allows the user to specify which user preset to store the sub-preset configuration.

Once the proper **configuration file** has been selected, and the desired **user preset** to store the sub-preset configuration has been selected, click the **Load** button to load the sub-preset into the specified user preset.

#### User Sub-preset Multiple Load

These controls provide the facilities to perform multiple loads of sub-preset XML configuration files into video path user presets using scripts.



**NOTE:** The sub-preset loading script must be placed in the same directory as the sub-preset XML configuration files.

**Script File:** By clicking the **Browse** button, the user can locate the sub-preset loading script file to be executed.

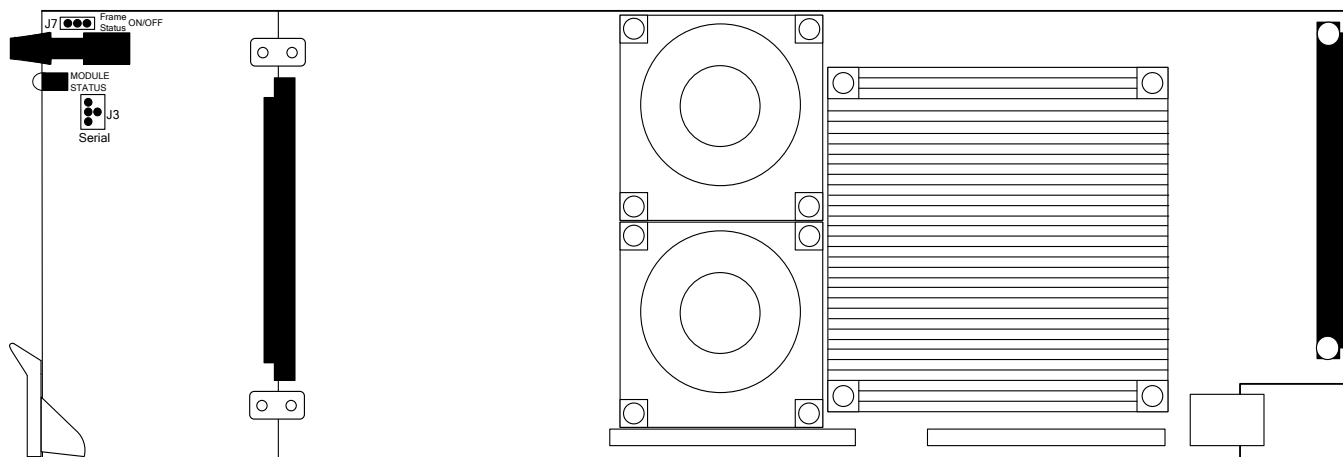
Once the proper **script file** has been selected, click the **Load** button to load the multiple sub-presets into the specified user presets.

The format of each line in the sub-preset loading script must be as follows:

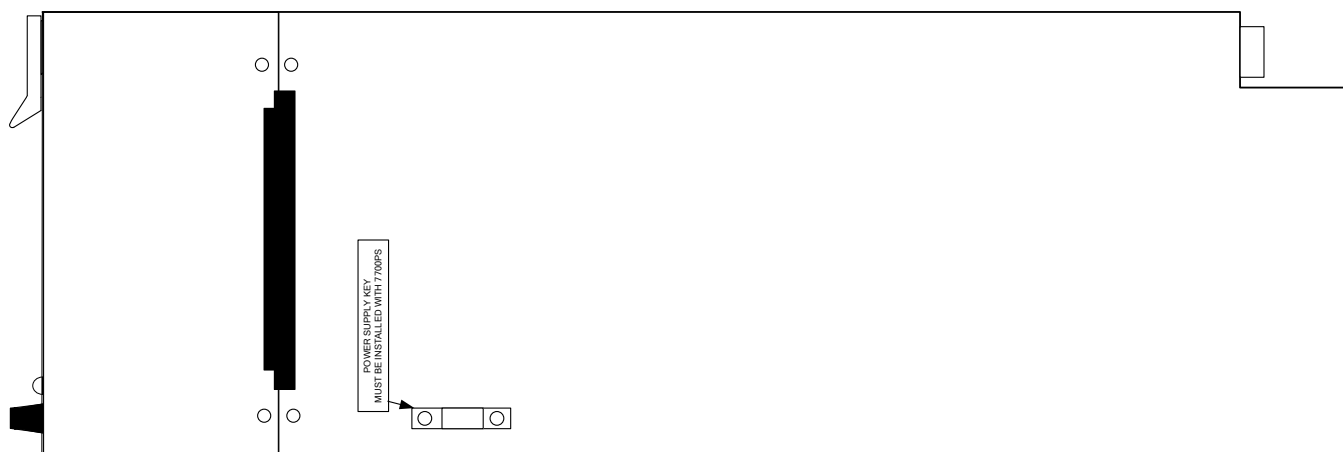
```
<name of sub-preset XML file>,<user preset #>
```

## 6. JUMPERS

Figure 6-1 and Figure 6-2 provides the locations of the jumpers and LEDs on the 7815VPDA series main module.



**Figure 6-1 : Location of Jumpers - Top View Main Module**



**Figure 6-2 : Location of Slot Blocker - Bottom View Main Module**

## 6.1. LOCAL FAULT MONITORING USING THE GLOBAL FRAME STATUS

**FRAME STATUS:** The FRAME STATUS jumper J7 is located near the front of the main module close to the shaft encoder knob. The FRAME STATUS jumper determines whether local faults (as shown by the LOCAL FAULT LED) will be connected to the 7700FR-C or 7800FR frame's global status bus.

To monitor faults on this module with the frame status indicators (on the PS FRAME STATUS LED's and on the Frame's Fault Tally output) install this jumper in the **ON** position. (Default)

When this jumper is installed in the **OFF** position, local faults on this module will not be monitored by the frame status indicators.

## 6.2. 7815VPDA Series Slot Blocker

The 7815 series of modules can be installed in either the 7700FR-C or the 7800FR frames. These modules are designed to take two slots in the Evertz 7800FR frame and three slots in the 7700FR-C.

Modules can fit into two slots in a 7800FR frame because the 7800FR allows modules to consume more power on a per slot basis than the Evertz 7700FR-C. When a 7815 series module is installed in the 7700FR-C, the module must occupy 3 slots to ensure that the frame power is managed properly. This is accomplished by installing a **Slot Blocker** on the bottom side of the board. If the **Slot Blocker** is not installed on the card and the card is inserted into the 7700FR, the card will not power-up. When installing the card in a 7800FR, the **Slot Blocker** may be removed and it will power-up and operate normally. If the **Slot Blocker** remains installed and the card is inserted into the 7800FR, the card will also power-up and operate normally, but it will unnecessarily block the usage of an additional slot in the 7800FR.

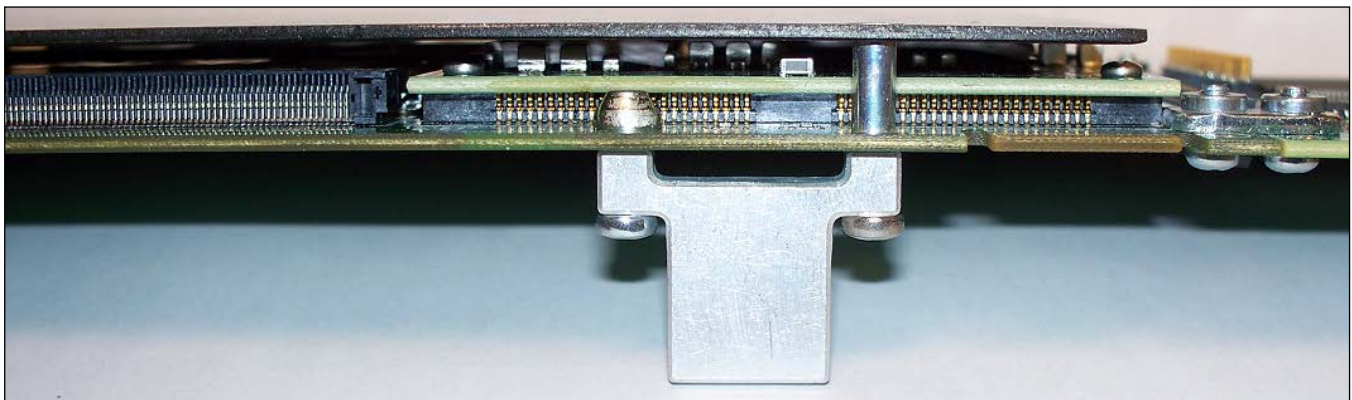


Figure 6-3 : Slot Blocker

## 7. UPGRADE PROCEDURES

There are multiple components of the module operation that can be upgraded. These include:

- VistaLINK<sup>®</sup> PRO Product JAR upgrade
- Firmware upgrade
- Product String upgrade

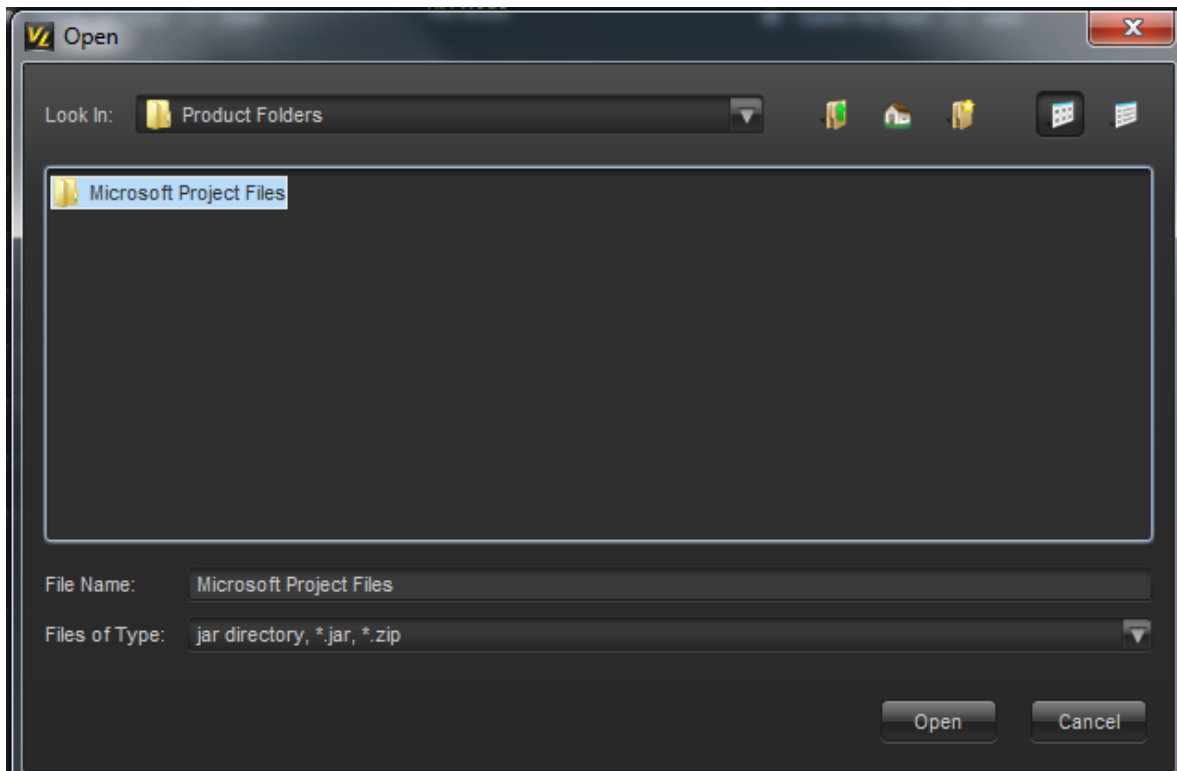
This section outlines the procedures for performing these module upgrades.



**NOTE:** If multiple components require upgrading simultaneously (*For example: VistaLINK<sup>®</sup> PRO JAR and Firmware*), it is recommended the upgrades are performed in the order presented in this section.

### 7.1. VISTALINK<sup>®</sup> PRO PRODUCT JAR UPGRADE

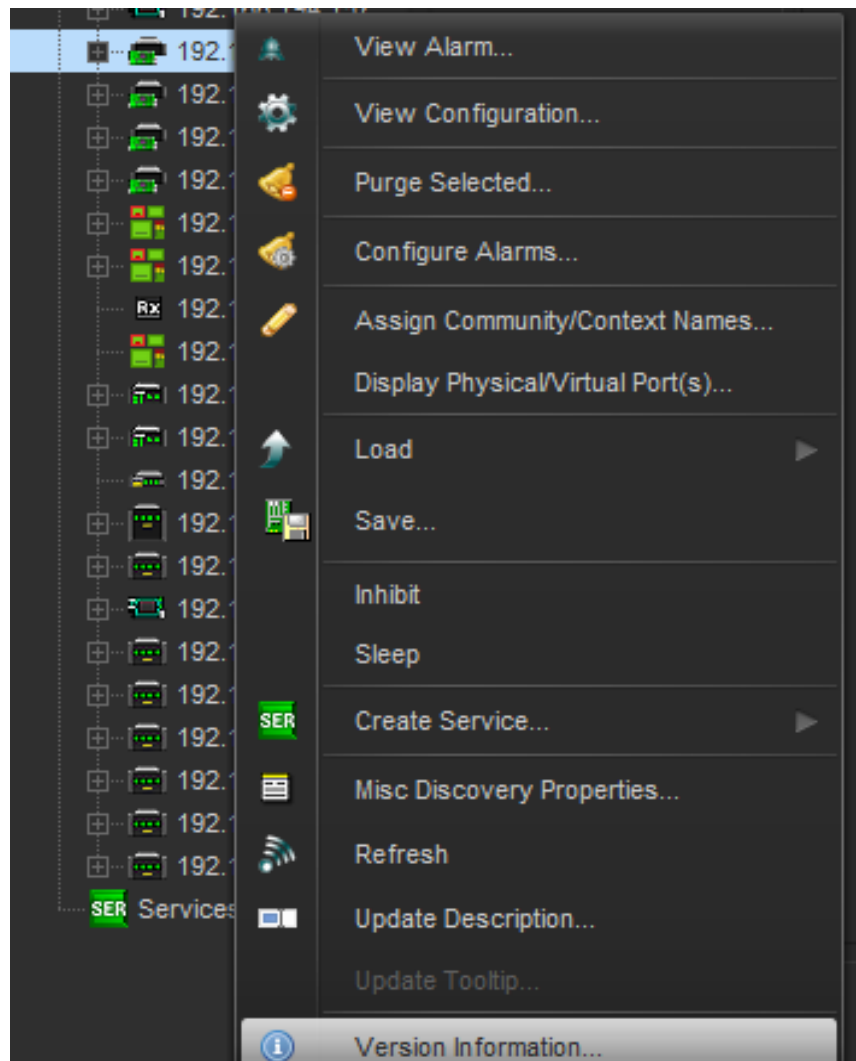
Open VISTALINK<sup>®</sup> PRO Server and navigate to *Help > Apply Update > Product*. When the window opens you want to select the latest .jar file for the 7815VPDA, from its saved location on the computer and select **Open**.



**Figure 7-1 : VistaLINK<sup>®</sup> PRO JAR Upgrade - Upgrade Window**

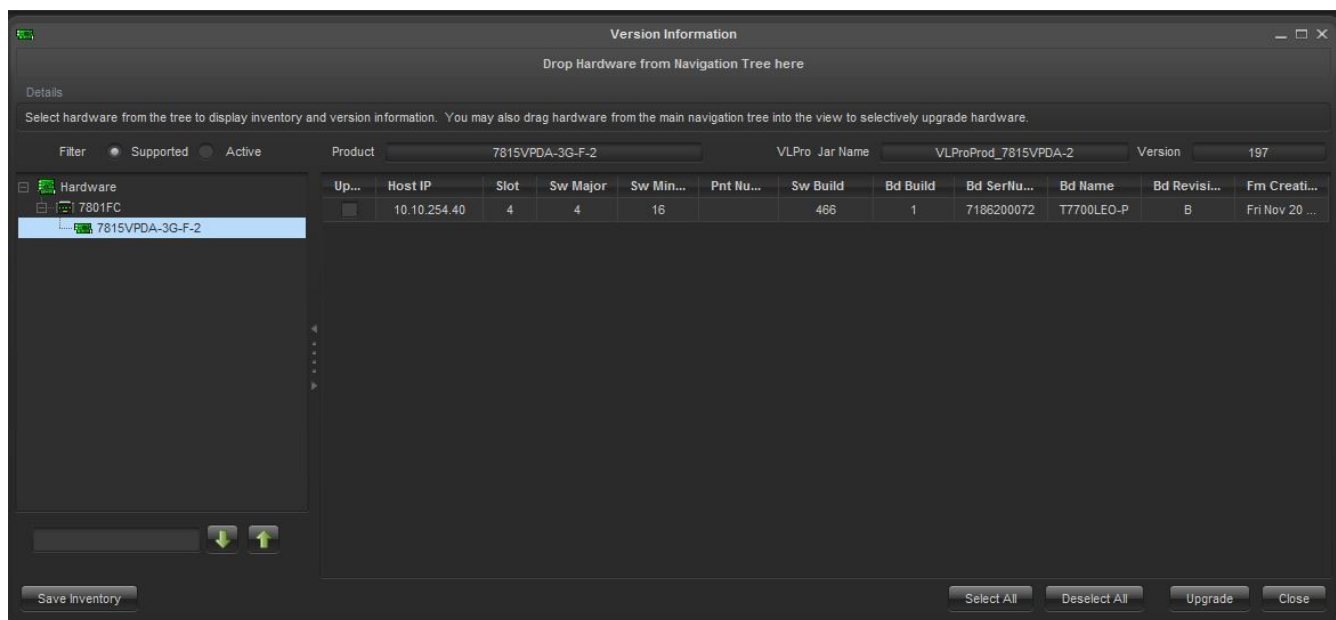
At this point the VistaLINK<sup>®</sup> PRO Server will send a message asking to Restart, select **Yes**. This will apply the update firmware to the 7815VPDA. Restart VISTALINK<sup>®</sup> PRO Server followed by VISTALINK<sup>®</sup> PRO Client.

When VISTALINK<sup>®</sup> PRO Client has re-opened; verify that the 7815VPDA is running the correct version. To check this, simply right click on the cards address in VistaLINK<sup>®</sup> PRO Client and select **Version Information**.



**Figure 7-2 : VistaLINK<sup>®</sup> PRO JAR Upgrade - Module Dropdown Menu**

This will open a window that displays all of the current version information loaded onto the 7815VPDA. Navigate the hardware tree on the left side of the version information window to select the 7815VPDA module. The *VISTALINK<sup>®</sup> PRO Product Version* reported in the top right corner of the window should match the new version. If it does not, please contact Evertz for further assistance.

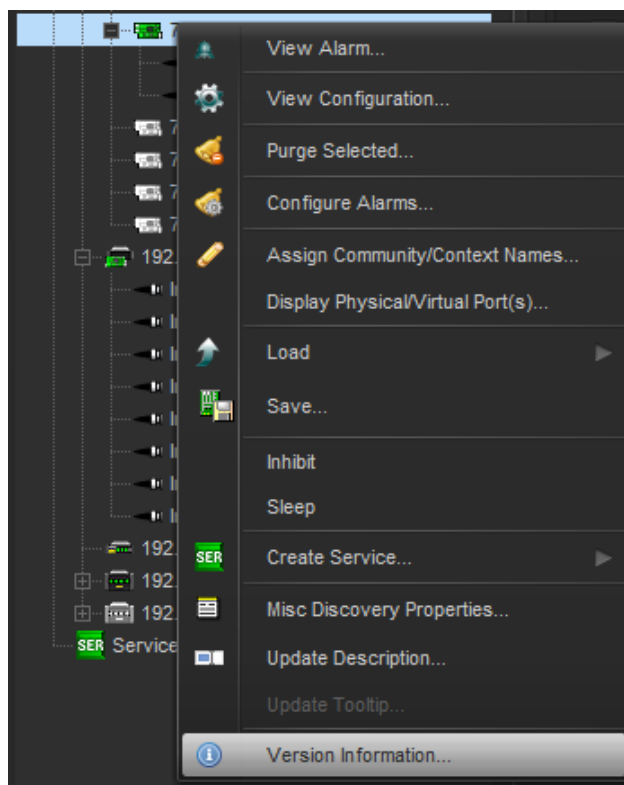


**Figure 7-3 : VistaLINK® PRO JAR Upgrade - Version Information Window**

## 7.2. FIRMWARE UPGRADE

A firmware upgrade can be accomplished through VistaLINK<sup>®</sup> PRO firmware upgrade facilities. All 7815VPDA modules within the same 7700FR/7800FR frame can be upgraded simultaneously or one-by-one. However, it is more convenient to upgrade them simultaneously.

Right click on 7700FR/7800FR frame that contains the 7815VPDA modules, and select *Version Information*

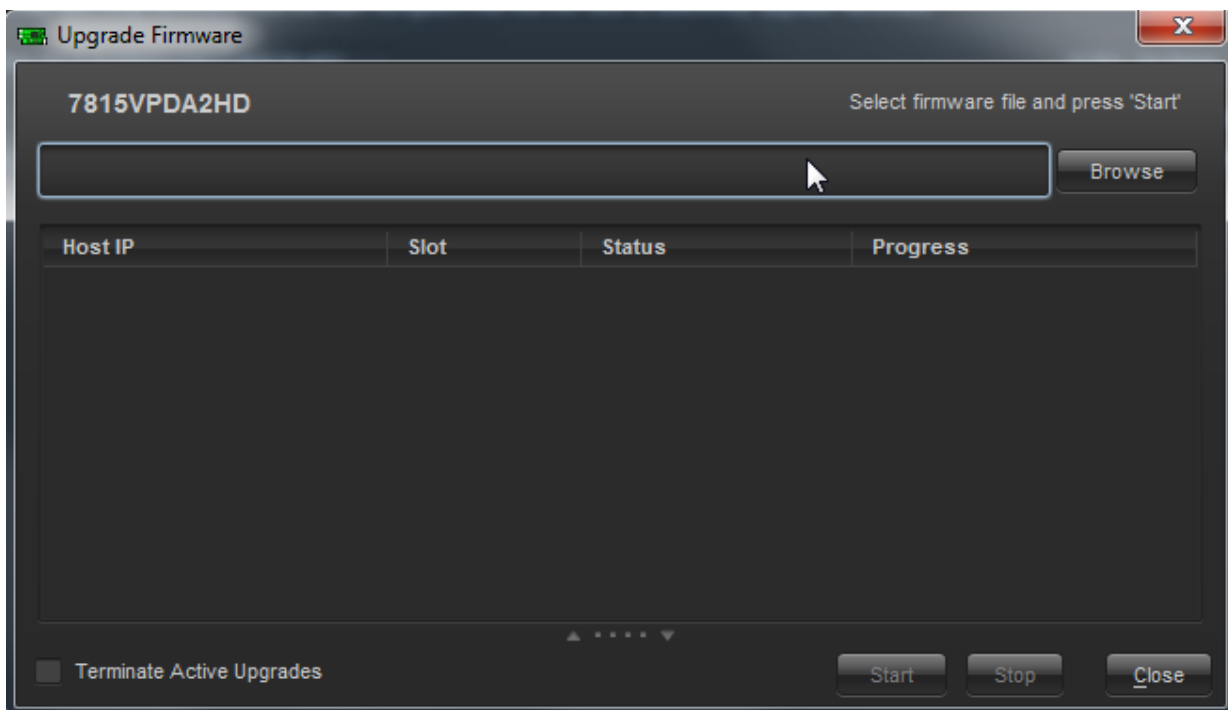


**Figure 7-4 : Firmware Upgrade - Version Information Selection**

Navigate the hardware tree on the left side of the version information window to select the 7815VPDA module listed (See Figure 7-4). The list on the right side of the window should populate with all 7815VPDA modules present in the 7700FR/7800FR. Take note of the current firmware version installed on the 7815VPDA modules to confirm the upgrade has completed successfully.

Check the *Upgrade* checkbox for all modules that require the firmware upgrade. Press Upgrade button. This will open a new *Upgrade Firmware* window. Press the Browse button to navigate to the firmware archive provided for upgrading the 7815VPDA modules (**File extension is .tar.gz**). Once the correct file has been selected, press the *Start* button to begin the upgrade process.





**Figure 7-5 : Firmware Upgrade - Version Information Window**

After the firmware has been transmitted to the 7815VPDA module successfully, the module will reboot to complete the firmware upgrade process. Close the *Upgrade Firmware* window and *Version Information* window.

Once the cards have rebooted, ensure all 7815VPDA modules are still present in the VistaLINK® PRO hardware tree. Right click on 7700FR/7800FR frame that contains the 7815VPDA modules, and select *Version Information*. Navigate the hardware tree on the left side of the version information window to select the 7815VPDA module listed. The list on the right side of the window should populate with all 7815VPDA modules present in the 7700FR/7800FR. Verify that all modules that have been upgraded are now reporting the expected firmware version.



**NOTE:** If any of the 7815VPDA modules do not properly upgrade the firmware, please power-cycle those boards and retry the procedure exclusively on the failed boards. If the issue still persists, contact Evertz for further assistance.

### 7.3. PRODUCT STRING UPGRADE

If a new product option has been purchased, it is necessary for the product options (*i.e. [-3G]*) to be included in the 7815VPDA module product string. Without the correctly updated product options, the 7815VPDA modules will not provide the additional functionality.

A unique checksum is required for each 7815VPDA module to upgrade the product string. These values must be entered correctly into VistaLINK<sup>®</sup> PRO to successfully update the product strings.



**NOTE:** Please contact Evertz to obtain the correct checksum values based on the reported 7815VPDA module serial numbers to be updated.

Each 7815VPDA module product string must be updated individually. To upgrade the 7815VPDA module product strings, open VistaLINK<sup>®</sup> PRO client, navigate to the desired 7815VPDA module in the hardware tree. Right click on the 7815VPDA module and select *View Configuration* to open the *Global configuration* view:

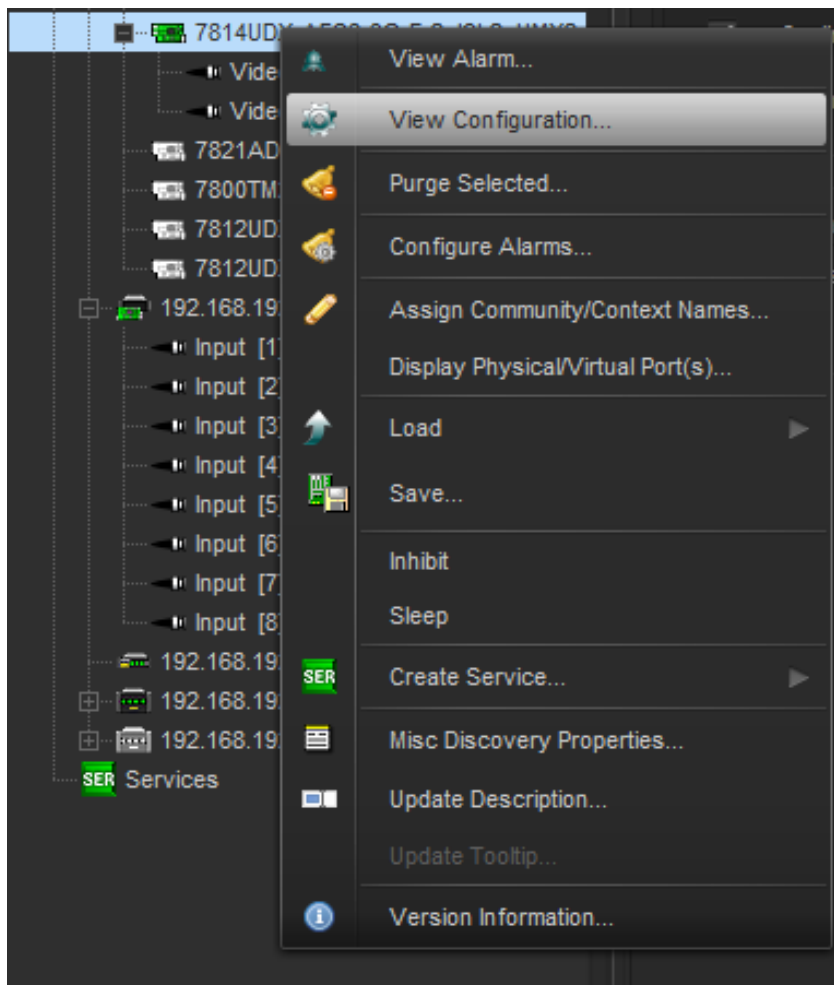
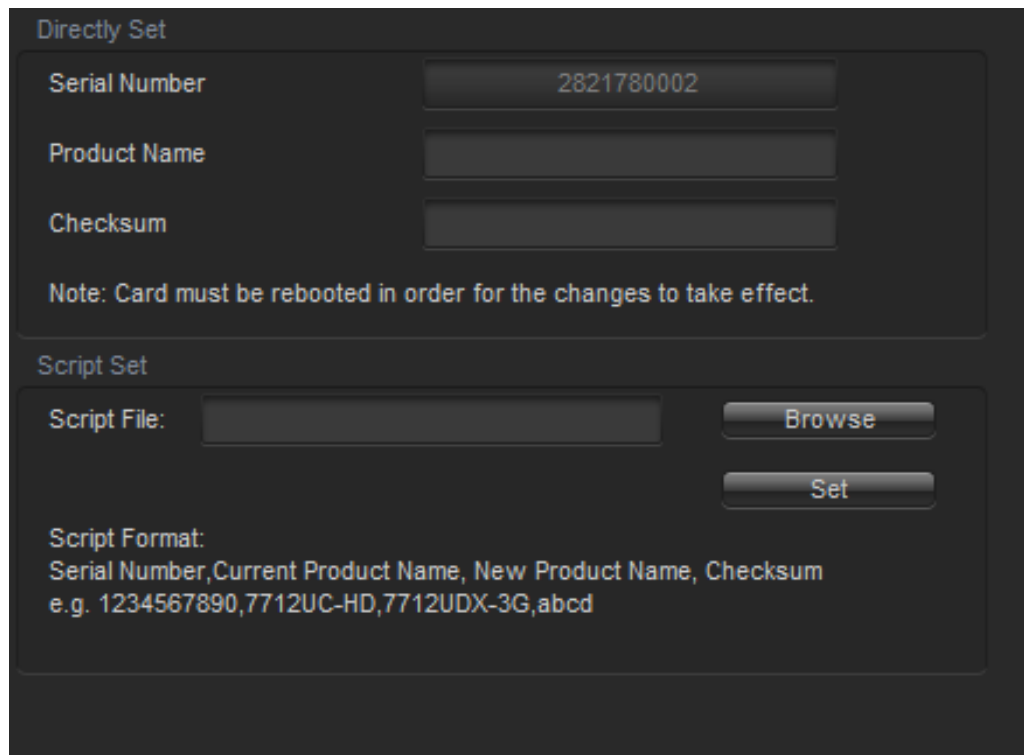


Figure 7-6 : Product String Upgrade - Opening 7815VPDA Module Configuration

Select the *Change Product* tab (See Figure 7-7).



The screenshot shows the 'Directly Set' tab with the following fields:

- Serial Number:** 2821780002
- Product Name:** (empty text box)
- Checksum:** (empty text box)

Below these fields is a note: "Note: Card must be rebooted in order for the changes to take effect."

The 'Script Set' tab is also visible, showing a 'Script File' field with a 'Browse' button and a 'Set' button. Below these is a 'Script Format' section with the text: "Serial Number, Current Product Name, New Product Name, Checksum e.g. 1234567890,7712UC-HD,7712UDX-3G,abcd".

**Figure 7-7 : Product String Upgrade – 7815VPDA Global Configuration View**

Enter the **new product name** in the *Product Name* text box.



**NOTE:** Ensure the product name matches the product name specified with the provided checksum based on the 7815VPDA module serial number in the *Serial Number* textbox.

Enter the **checksum** in the *Checksum* text box.



**NOTE:** Ensure the checksum matches the checksum value specified according to the reported serial number in the *Serial Number* textbox.

Click the *Apply Button* (first blue arrow in top left of configuration view window) to update the 7815VPDA module product string. If the product string upgrade is successful, the product string specified in the VistaLINK® PRO hardware tree should update with the added product options. It can take approximately 5 minutes for the product string to update in VistaLINK® PRO.



**NOTE:** If any of the 7815VPDA modules do not properly upgrade the product string, please power-cycle those boards and retry the procedure exclusively on the failed boards. If the issue still persists, contact Evertz for further assistance.

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## 8. APPENDIX A – VERSION INFORMATION

### 8.1. HARDWARE OPTIONS

This manual covers the following hardware options:

- 7815VPDA-3G-F-2
- 7815VPDA-HD-F-2

### 8.2. SOFTWARE VERSIONS

This manual has been written using the following software versions. Functionality may not be identical to the manual description if the module is operating with a different firmware or VistaLINK® PRO product JAR versions.

- VistaLINK® PRO Product JAR File Version: **218**
- Firmware Version: **5.20 build 643**

*End of Document*