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XIP-3901

Agile SDI/IP Processing Platform

User Manual

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www.grassvalley.com

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13-03065-010-AF-M00	2020-02-06	Documented a card upgrade procedure to add and select a card application.

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- Ensure that the frame is electrically connected to earth ground through the power cord or any other means if available.
- Wear an ESD wrist strap, ensuring that it makes good skin contact. Connect the grounding clip to an *unpainted surface* of the chassis frame to safely ground unwanted ESD voltages. If no wrist strap is available, ground yourself by touching the *unpainted* metal part of the chassis.
- For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megaohms.
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- IEC/EN 60825-1 Safety of laser products
- IEC 60950-1 Safety of information technology equipment

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XIP-3901		有毒有害物质或元素 (Toxic or Hazardous Substances and Elements)					
部件名称Part name	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)	
电缆及电缆组件Cables and Cable Assemblies	O	O	O	O	O	O	
电路模块 Circuit Modules	X	O	O	O	O	O	
组装风扇 Fan Assemblies	X	O	O	O	O	O	
XIP-3901-3+DRP		有毒有害物质或元素 (Toxic or Hazardous Substances and Elements)					
部件名称Part name	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)	
电路模块 Circuit Modules	X	O	O	O	O	O	

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006规定的限量要求以下。
O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T 11363-2006.

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006规定的限量要求。
X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T 11363-2006.

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 This equipment has been tested for compliance with FCC Part 15, Subpart B requirements for Class A digital devices.

NOTE: 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.



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- EN 55022 Class A radiated and conducted emissions
- EN 61000-3-2 Harmonic current emission limits
- EN 61000-3-3 Voltage fluctuations and flicker limitations
- EN 61000-4-2 Electrostatic discharge immunity
- EN 61000-4-3 Radiated electromagnetic field immunity – RF
- EN 61000-4-4 EFT immunity
- EN 61000-4-5 Surge immunity
- EN 61000-4-6 Conducted immunity
- EN 61000-4-8 EMP immunity
- EN 61000-4-11 Voltage dips, short interruptions and voltage variations immunity

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1 Introduction to the XIP-3901 Agile SDI/IP Processing Platform

The Densité 3+ XIP-3901 from Grass Valley, a Belden Brand, is a new agile processing platform that focuses on high-quality live production for HD, 1080p, 4K UHD and HDR. This platform is a bridge for the hybrid world, consisting of today’s proven SDI technology and the IP connectivity of tomorrow.



Figure 1–Densité 3+ and XIP-3901

To meet customers’ needs both now and in the future, the XIP-3901 uses a flexible “virtualized” hardware platform. Based on a powerful FPGA engine, the XIP-3901 can be reconfigured with software updates for different applications as requirements change.

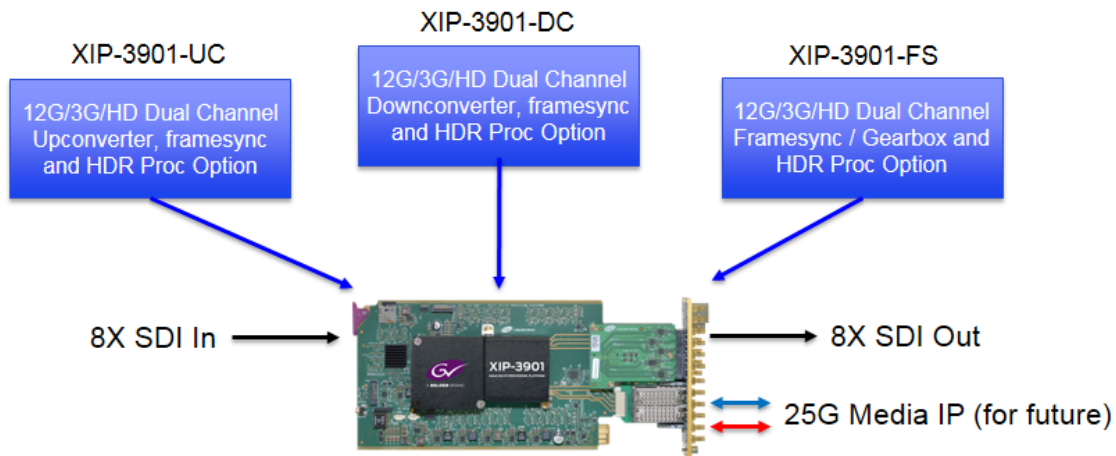


Figure 2– XIP-3901 Agile IP/SDI Processing Platform

The XIP-3901 agile processing platform with a rear XIP-3901-3+DRP comes with all the 12G/Quad Link 3G/3G/HD-SDI connectivity to support two 4K UHD processing paths with dual 25 GbE SFP cages for future IP I/O migration. The XIP-3901 is installed in a Densité modular frame. Due to advanced processing capabilities and power requirements, the XIP-3901 is supported by the Densité 3+ FR1 and FR4 frames.

Based on the proven Densité modular framework of over 100 cards, the flexible, space-efficient XIP-3901 agile processing platform can accommodate a gradual adoption of different production elements into 1080p and 4K UHD broadcasting workflows — and it enables dual HDR/SDR production — all while protecting your investment in installed equipment. With flexibility to configure up to 12 XIP-3901 dual-channel processing applications per Densité 3+ FR4 frame, the Densité platform scales to a market-leading density of 24 4K UHD processors with HDR conversions in a 4 RU frame. This means space and cost-efficient scaling today and tomorrow. The XIP-3901 is integrated with iControl customized end-to-end facility monitoring to provide configuration, alarms and logging services.

2 XIP-3901 Applications

The initial applications for the XIP-3901 agile IP/SDI processing platform provides full functionality of up/down/frame sync-gearbox processing capability delivered through four applications that allow your live productions — either from trucks, venues or stadiums — to make the most of the new 4K UHD and HDR formats. This includes playout channels where output of a 4K UHD HDR channel needs to be downconverted for an HD SDR simulcast version.

Densité 3+ XIP-3901-UC is an application that provides a dual-channel 12G/Quad Link 3G/3G/HD-SDI upconverter, which is designed to synchronize, upconvert and process HD and 3G 1080p signals for both 1080p and 4K UHD 2160p broadcast production. The XIP-3901-UC application features broadcast-quality scalers, motion-adaptive de-interlacers and color space conversions from ITU-R BT.709 to ITU-R BT.2020.

Densité 3+ XIP-3901-DC is an application that provides a dual-channel 12G/Quad Link 3G/3G/HD downconverter, which is designed to synchronize, downconvert and process 4K UHD 2160p and 1080p for both 1080p and HD broadcast production. The XIP-3901-DC application features broadcast-quality down-scalers, interlacers and color space conversions from ITU-R BT.2020 to ITU-R BT.709.

Densité 3+ XIP-3901-FS is an application that provides a dual-channel 12G/Quad Link 3G/3G/HD frame synchronizer with gearbox functionality, which is designed to synchronize and convert color space between ITU-R BT.2020 and ITU-R BT.709 in 4K UHD, 1080p and HD broadcast productions.

All applications will delay 12G/3G/HD embedded audio and metadata to maintain synchronization with video. The optional HDR processor, XIP-3901-UDC-HDR, allows conversion between SDR and HDR formats, supporting HLG (ITU-R BT.2100), PQ (ITU-R BT.2100) and S-Log3/S-Gamut3 formats, with conversion between formats. In addition to the Grass Valley LUTs, you can select BBC LUTs v1.3.1 or you can choose your own Custom LUTs compliant to Adobe cube file v1.0 for fully flexible HDR processing.

2.1 Key Features

- Independent dual processing channels
- 12G 2160p, 3G 1080p and HD 1080i/720p input/output (depending on application)
- 12G-SDI Mode 1 and Type 1
- Quad Link 3G in 2SI and Square Division
- 3G Level A & Level B Dual Link
- High-quality scaler and advanced de-interlacer on XIP-3901-UC
- High-quality downscaler and interlacer on XIP-3901-DC
- 12G-SDI to/from Quad Link 3G in 2SI/Square Division on XIP-3901-FS
- Integrated frame synchronizer (freeze to last valid frame/field on error)
- Minimum processing delay mode available on XIP-3901-FS
- Audio/video deglitcher to handle video hot switch at the input
- Broadcast-quality color conversion (between ITU-R BT.709 and ITU-R BT.2020)
- SDR/HDR optional processing support HLG, PQ, and S-Log3/S-Gamut3 formats
- Selection between GV LUTs, BBC LUTs v1.3.1, or User Custom LUTs
- External reference or URS frame reference
- Embedded audio and metadata delay and synchronization
- Individual application licensed, purchased as needed
- Rapid switching between applications

2.2 Supported Video Formats

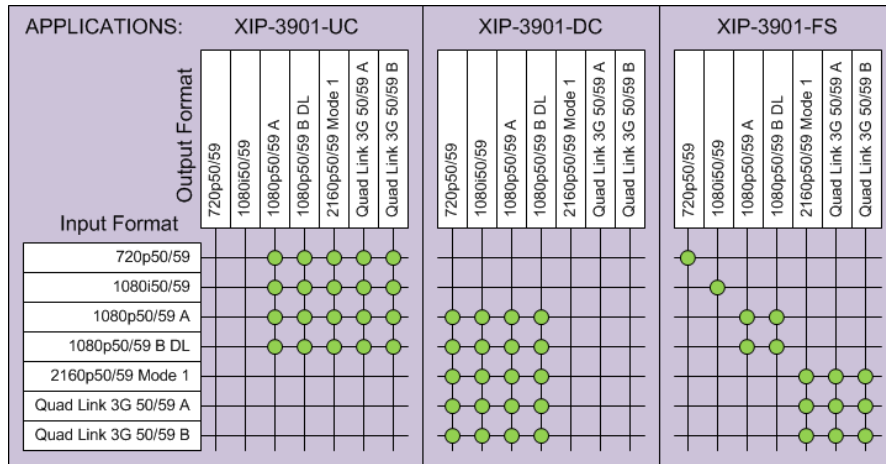


Figure 3—Supported Video Formats for XIP-3901 Applications

Note: 50/59.94 Hz frame rate conversion is not supported.

2.3 Optional HDR Processing

The IP-3901 applications include ITU-R BT.709 and ITU-R BT.2020 color space conversions. The **XIP-3901-UDC-HDR** option adds HDR/SDR up-mapping and down-mapping capabilities, as summarized in the following table:

GV LUT Conversions	BBC LUT v1.3.1	User Defined LUT
BT. 709 ↔ BT. 2020	BT.709 ↔ HLG BT.2100 SCENE REFERRED	Adobe cube file v1.0 – 33 cube
BT. 709 ↔ HLG BT.2100	BT.709 ↔ HLG BT.2100 DISPLAY REFERRED	BT. 709 ↔ BT. 2020
BT. 709 ↔ PQ ST.2100	HLG BT.2110 ↔ PQ 1000 BT.2110	Narrow ↔ Full range
HLG BT.2100 ↔ PQ ST.2100	PQ 4000 BT.2110 → HLG BT.2110	
S-Log3/S-Gamut3 → BT. 709	S-Log3 BT.2020 → HLG BT.2110	
S-Log3/S-Gamut3 → HLG BT.2100		
S-Log3/S-Gamut3 → PQ BT.2100		

And ITU R BT 2111 HLG/PQ Color bar test patterns

Figure 4– HDR/SDR Up-mapping and Down-mapping Capabilities for XIP-3901-UC / -DC / -FS Application

See [10.9 Options Panel](#) for how to enable this option.

2.4 Functional Block Diagrams

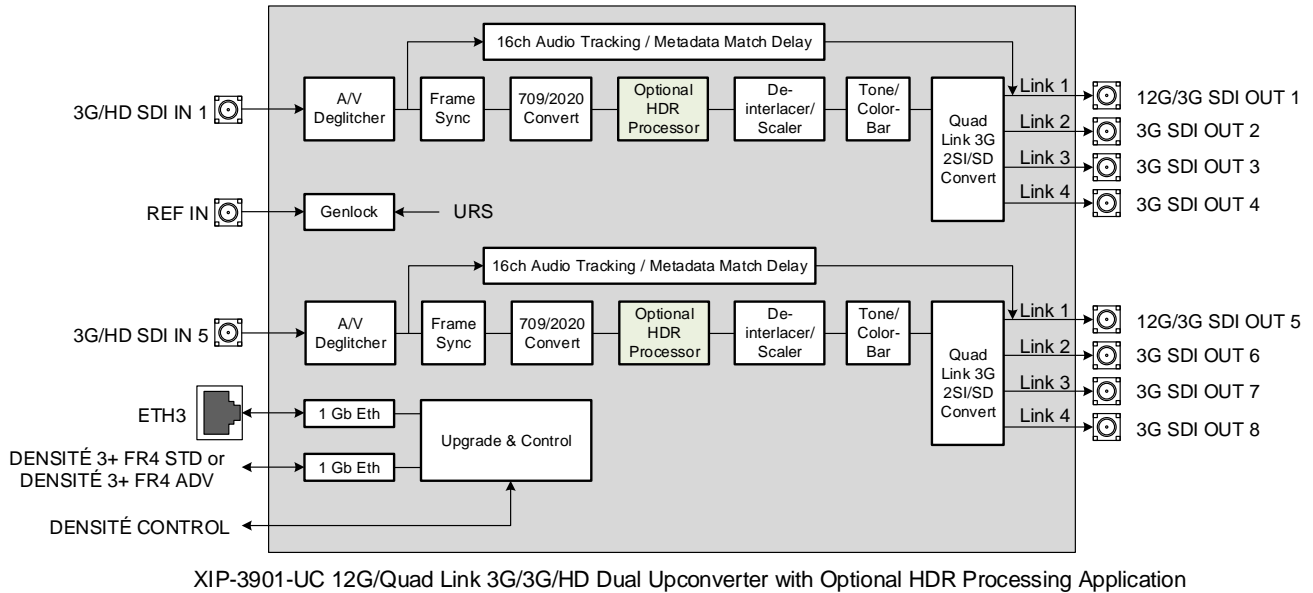


Figure 5—XIP-3901-UC Functional Block Diagram

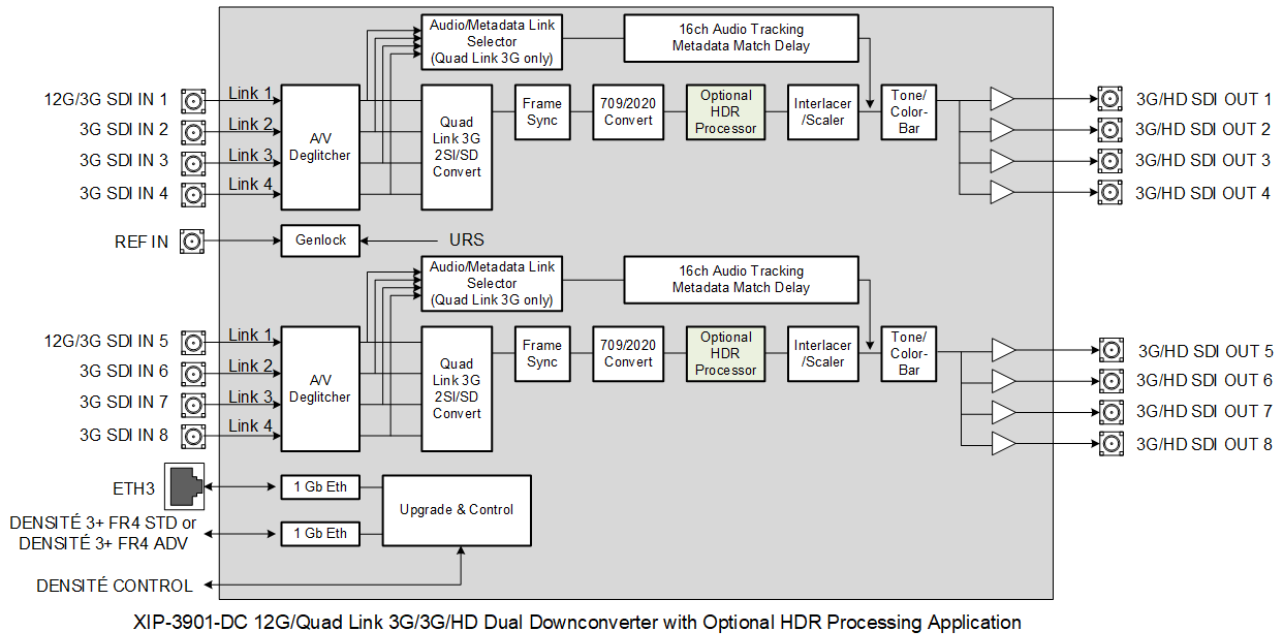


Figure 6—XIP-3901-DC Functional Block Diagram

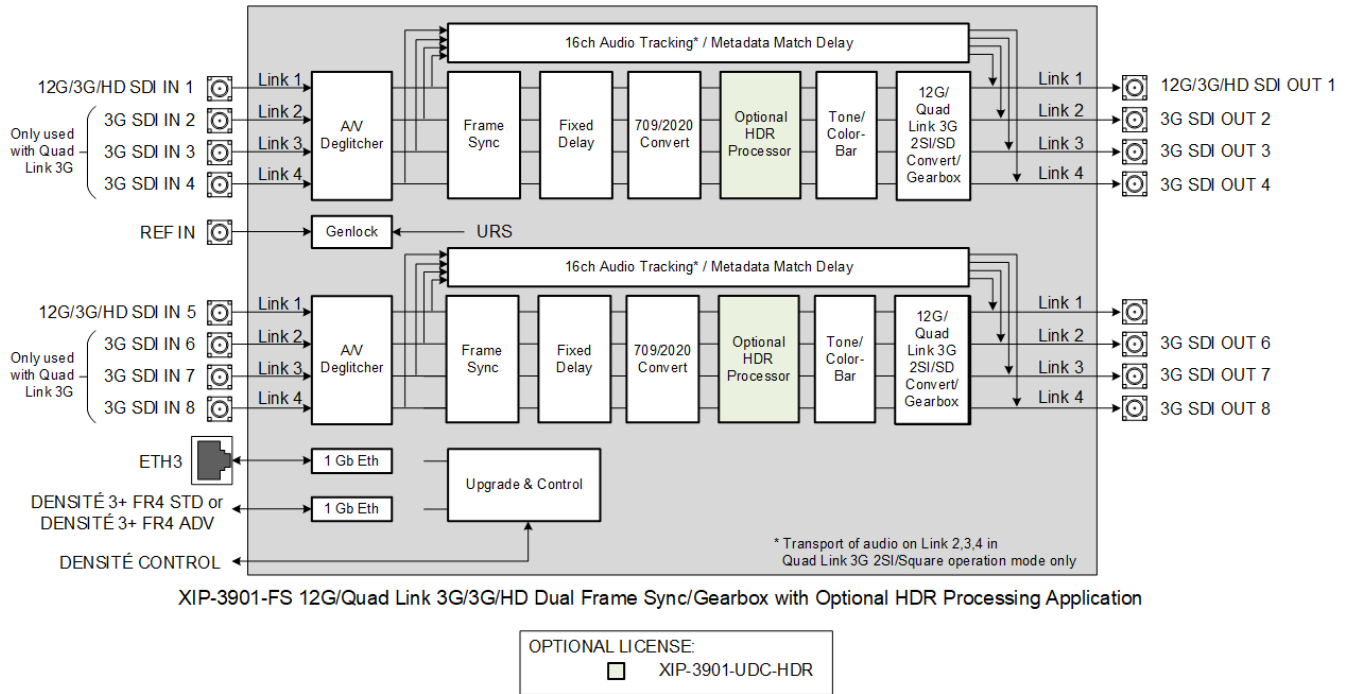


Figure 7–XIP-3901-FS Functional Block Diagram

3 Front Card-edge Interface

The front card-edge of the XIP-3901 incorporates two elements:

- Status LED (see [5.2 Card-edge Status LED](#))
- Select button (see [6 Local Control Using the Densité Frame Control Panel](#))

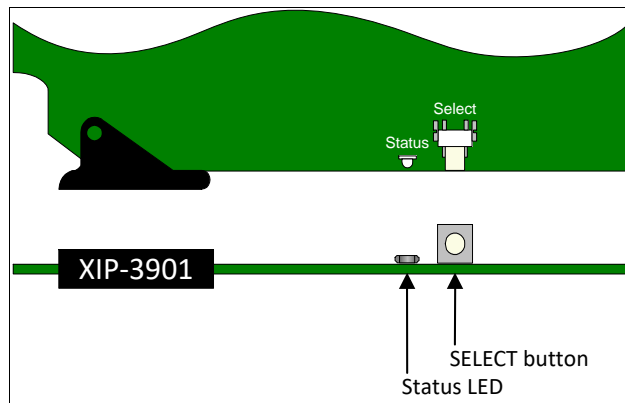


Figure 8–Front Card-edge Layout

4 Installation

4.1 Installing the Rear Connector Panel

Each Grass Valley Densité-series card is associated with a rear connector panel, which must be installed in the Densité frame before the card can be inserted.

The XIP-3901 card is designed to fit into Grass Valley's Densité3+ frames. One rear connector panel is available:

- XIP-3901-3+DRP: Double rear connector panel for Densité 3+

See [4.3 Rear Connector Panel](#) for details about the signal connections available on this panel.

All cards and rear connector panels can be installed with the frame powered on. The card has connectors that plug into a mid-frame motherboard to distribute power and connect to the controller card, as well as a second connector that plugs directly into the rear connector panel for input and output.

To install the connector panel:



The rear connector panel must be installed with the card out of the frame.

1. If a card is installed in the slot for which the rear connector panel is being changed, it must be removed. Tilting the swivel handle on the front of the card to lever the connectors apart, and then use the handle to pull the card straight out of the slot.
2. Remove the existing rear connector panel (either blank or belonging to an existing card that is being changed) by releasing the captive screw(s) at the bottom (Densité3+ or Densité-3+FR4) or on the side (Densité-3+FR1) of the panel.
3. Position the new rear connector panel and secure it in place with the captive screw(s) at the bottom or on the side.

4.2 Installing the XIP-3901 Card

Once a matching rear connector panel is in place, install the XIP-3901 card as follows:

1. Open the front panel of the frame.
2. Slide the XIP-3901 card into the slot and push gently on the handle to seat the connectors.
 - When using a double-slot-width rear panel in a Densité-3+FR1 frame, the card should be inserted into the lower of the two slots.
 - When using a double-slot-width rear panel in a Densité-3+FR4 frame, the card should be inserted into the rightmost of the two slots.

Inserting the card into the wrong slot will not damage the card, but the status LED on the card will flash red to indicate that there is no connection to the rear panel.

3. Close the front panel of the frame.

4.3 Rear Connector Panel

4.3.1 Image of the Rear Connector Panel

The rear connector panel is shown in [Figure 9](#). Details of the inputs and outputs are described below. Note that an application may not use all available inputs and outputs.

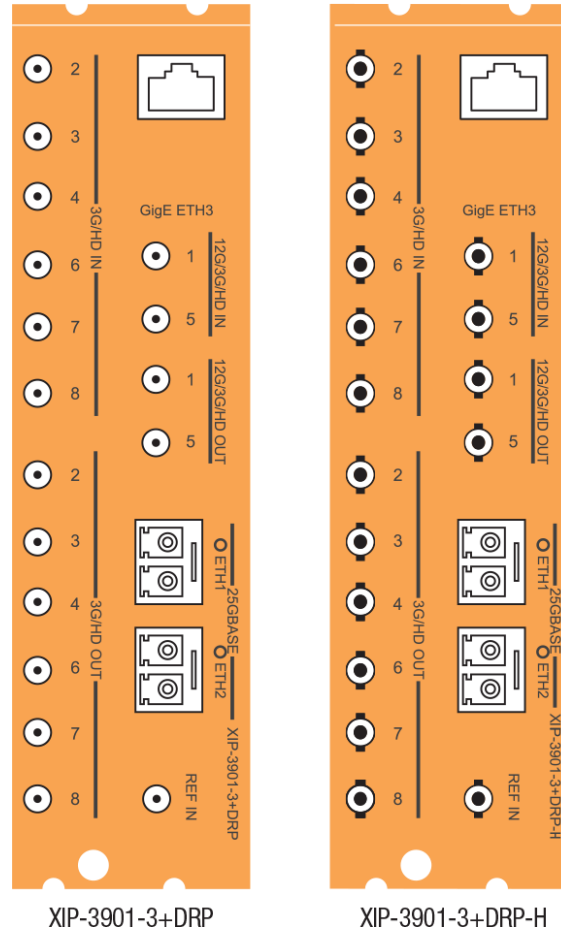


Figure 9–XIP-3901 Rear Panels

4.3.2 Summary of Rear Panel Connections

Connector Nomenclature	Count	XIP-3901-3+DRP Rear Connector Type	XIP-3901-3+DRP-H Rear Connector Type	Used for application
REF IN	1	DIN	HD BNC	XIP-3901-UC / -DC / -FS
3G/HD IN 2 / 3 / 4 / 6 / 7 / 8	6	DIN	HD BNC	XIP-3901 -DC / -FS
12G/3G/HD IN 1 / 5	2	DIN	HD BNC	XIP-3901-UC / -DC / -FS
3G/HD OUT 2 / 3 / 4 / 6 / 7 / 8	6	DIN	HD BNC	XIP-3901-UC / -FS
12G/3G/HD OUT 1 / 5	2	DIN	HD BNC	XIP-3901-UC / -DC / -FS
25G BASE ETH1 / ETH2	2	SFP+	SFP+	Future
GigE ETH3	1	RJ-45	RJ-45	XIP-3901-UC / -DC / -FS

4.3.3 Details of Rear Panel Connections

REF IN – External reference

Connect an NTSC or PAL reference signal (SMPTE 170M/SMPTE 318M/ITU 624-4 black burst). This is used with the XIP-3901-UC / -DC / -FS applications only.

12G/3G/HD IN – Serial digital 3G/HD Inputs

Connect serial digital video signals, conforming to SMPTE ST 2081 and ST 2082 for 12G input signals, SMPTE 425M for 3G input signals or SMPTE 292M for HD input signals, to the connectors specified in the tables below. This is used with the XIP-3901-UC / -DC / -FS applications only.

Connector Nomenclature	XIP-3901-UC Input Signal
12G/3G/HD IN 1	UC1 3G/HD SDI
3G/HD IN 2	Not used
3G/HD IN 3	Not used
3G/HD IN 4	Not used
12G/3G/HD IN 5	UC2 3G/HD SDI
3G/HD IN 6	Not used
3G/HD IN 7	Not used
3G/HD IN 8	Not used

Connector Nomenclature	XIP-3901-DC Input Signal
12G/3G/HD IN 1	DC1 Quad Link 3G - Link 1/12G/3G
3G/HD IN 2	DC1 Quad Link 3G - Link 2
3G/HD IN 3	DC1 Quad Link 3G - Link 3
3G/HD IN 4	DC1 Quad Link 3G - Link 4
12G/3G/HD IN 5	DC2 Quad Link 3G - Link 1/12G/3G
3G/HD IN 6	DC2 Quad Link 3G - Link 2
3G/HD IN 7	DC2 Quad Link 3G - Link 3
3G/HD IN 8	DC2 Quad Link 3G - Link 4

Connector Nomenclature	XIP-3901-FS Input Signal
12G/3G/HD IN 1	FS1 Quad Link 3G - Link 1/12G/3G/HD
3G/HD IN 2	FS1 Quad Link 3G - Link 2
3G/HD IN 3	FS1 Quad Link 3G - Link 3
3G/HD IN 4	FS1 Quad Link 3G - Link 4
12G/3G/HD IN 5	FS2 Quad Link 3G - Link 1/12G/3G/HD
3G/HD IN 6	FS2 Quad Link 3G - Link 2
3G/HD IN 7	FS2 Quad Link 3G - Link 3
3G/HD IN 8	FS2 Quad Link 3G - Link 4

12G/3G/HD OUT– Serial digital 12G/3G/HD outputs

SDI output signals appear on the rear panel connectors as shown in the table, conforming to SMPTE ST 2081 and ST 2082 for 12G output signals, SMPTE 425M for 3G output signals or SMPTE 292M for HD output signals. This is used with the XIP-3901-UC / -DC / -FS applications only.

Connector Nomenclature	XIP-3901-UC Output Signal
12G/3G/HD OUT 1	UC1 Quad Link 3G - Link 1/12G/3G
3G/HD OUT 2	UC1 Quad Link 3G - Link 2
3G/HD OUT 3	UC1 Quad Link 3G - Link 3
3G/HD OUT 4	UC1 Quad Link 3G - Link 4
12G/3G/HD OUT 5	UC2 Quad Link 3G - Link 1/12G/3G
3G/HD OUT 6	UC2 Quad Link 3G - Link 2
3G/HD OUT 7	UC2 Quad Link 3G - Link 3
3G/HD OUT 8	UC2 Quad Link 3G - Link 4

Connector Nomenclature	XIP-3901-DC Output Signal
12G/3G/HD OUT 1	DC1 3G/HD SDI
3G/HD OUT 2	DC1 3G/HD SDI
3G/HD OUT 3	DC1 3G/HD SDI
3G/HD OUT 4	DC1 3G/HD SDI
12G/3G/HD OUT 5	DC2 3G/HD SDI
3G/HD OUT 6	DC2 3G/HD SDI
3G/HD OUT 7	DC2 3G/HD SDI
3G/HD OUT 8	DC2 3G/HD SDI

Connector Nomenclature	XIP-3901-FS Output Signal
12G/3G/HD OUT 1	FS1 Quad Link 3G - Link 1/12G/3G/HD
3G/HD OUT 2	FS1 Quad Link 3G - Link 2
3G/HD OUT 3	FS1 Quad Link 3G - Link 3
3G/HD OUT 4	FS1 Quad Link 3G - Link 4
12G/3G/HD OUT 5	FS2 Quad Link 3G - Link 1/12G/3G/HD
3G/HD OUT 6	FS2 Quad Link 3G - Link 2
3G/HD OUT 7	FS2 Quad Link 3G - Link 3
3G/HD OUT 8	FS2 Quad Link 3G - Link 4

ETH1, ETH2 – 25 GigE on fiber (SFP+)

Transmit and receive video/audio/metadata streams.

Note: Not used for these SDI applications.

GigE ETH3 – 1 GigE Port (Control Port) on RJ-45

This network port is used for Densité Upgrade Manager (DUM) upgrades and to download Custom LUTs. This connection is not necessary when the XIP-3901 is used with Densité frames that are equipped with Densité 3+FR4 STD or Densité 3+ FR4 ADV frame controllers that are connected to the management IP network.

5 User Interface

5.1 Control Methods

The XIP-3901 card's applications can be controlled in two different ways:

- The local control panel and its buttons can be used to move through a menu of status reports (see [6 Local Control Using the Densité Frame Control Panel](#)).
- Grass Valley's iControl system must be used to access the card's operating parameters remotely using a convenient graphical user interface (GUI) (see 7 Card Upgrade on page 21).

5.2 Card-edge Status LED

The status LED is located on the front card-edge of the XIP-3901 and is visible through the front access door of the Densité-3 frame. This LED indicates the status of the XIP-3901 using different colors and by flashing/steady illumination.

The table shows how the various error conditions that can be flagged on the XIP-3901 affect the LED status.

- If a cell is gray, the LED cannot be configured to assume that status.
- If more than one LED status is possible for a particular error condition, the status is configurable. See [10.11 Alarm Config Panel](#) for details.
- The factory default status, if available, is marked with a ⚙ symbol.

The LED will always show the most severe error status that has been detected and that it is configured to display. In the chart, error severity increases from left to right. Green represents no error/disabled, and flashing red represents the most severe error.

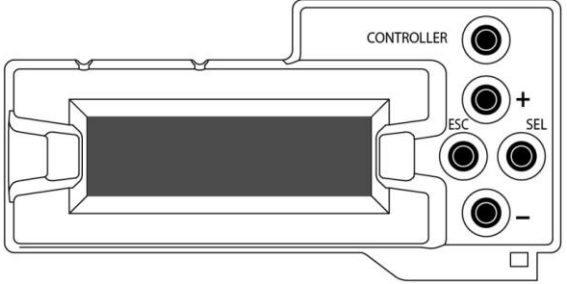

Note: If the LED is flashing yellow, the card has been selected for local control using the Densité frame control panel. See [6 Local Control Using the Densité Frame Control Panel](#) for details.

Error Condition	LED Status			
	Green	Yellow	Red	Flashing Red
Hardware failure				⚙
Wrong or missing rear connector panel				⚙
UC1/DC1/FS1 IN1 – No carrier			⚙	
UC1/DC1/FS1 IN1 – Unsupported			⚙	
UC1/DC1/FS1 IN1 – Video/TRS error			⚙	
UC1/DC1/FS1 IN1 – Reference mismatch			⚙	
DC1/FS1 IN2 – No carrier			⚙	
DC1/FS1 IN2 – Unsupported			⚙	
DC1/FS1 IN2 – Video/TRS error			⚙	
DC1/FS1 IN2 – Reference mismatch			⚙	
DC1/FS1 IN3 – No carrier			⚙	
DC1/FS1 IN3 – Unsupported			⚙	
DC1/FS1 IN3 – Video/TRS error			⚙	
DC1/FS1 IN3 – Reference mismatch			⚙	
DC1/FS1 IN4 – No carrier			⚙	

Error Condition	LED Status			
	Green	Yellow	Red	Flashing Red
DC1/FS1 IN4 – Unsupported			✱	
DC1/FS1 IN4 – Video/TRS error			✱	
DC1/FS1 IN4 – Reference mismatch			✱	
DC1/FS1 – Quad Link 3G ALIGN			✱	
UC2/DC2/FS2 IN5 – No carrier			✱	
UC2/DC2/FS2 IN5 – Unsupported			✱	
UC2/DC2/FS2 IN5 – Video/TRS error			✱	
UC2/DC2/FS2 IN5 – Reference mismatch			✱	
DC2/FS2 IN6 – No carrier			✱	
DC2/FS2 IN6 – Unsupported			✱	
DC2/FS2 IN6 – Video/TRS error			✱	
DC2/FS2 IN6 – Reference mismatch			✱	
DC2/FS2 IN7 – No carrier			✱	
DC2/FS2 IN7 – Unsupported			✱	
DC2/FS2 IN7 – Video/TRS error			✱	
DC2/FS2 IN7 – Reference mismatch			✱	
DC2/FS2 IN8 – No carrier			✱	
DC2/FS2 IN8 – Unsupported			✱	
DC2/FS2 IN8 – Video/TRS error			✱	
DC2/FS2 IN8 – Reference mismatch			✱	
DC2/FS2 – Quad Link 3G ALIGN			✱	
UC1/DC1/FS1 – Reference present			✱	
UC1/DC1/FS1 – Reference supported			✱	
UC1/DC1/FS1 – Reference locked			✱	
UC2/DC2/FS2 – Reference present			✱	
UC2/DC2/FS2 – Reference supported			✱	
UC2/DC2/FS2 – Reference locked			✱	
UC1/DC1/FS1 – Color Bars & Tone enabled		✱		
UC2/DC2/FS2 – Color Bars & Tone enabled		✱		
ETH3 – Network link up	✱			

6 Local Control Using the Densité Frame Control Panel

There are two types of local control panels:

Panel type	Frame models	Appearance
Physical	Densité-3+FR1	
Touch-screen	Densité-3+FR4, GV Node	

To assign the local control panel to the XIP-3901:

- Physical panel: Open the front door of the frame to access the panel. Push the [SELECT] button on the front of the card (see 3 [Front Card-edge Interface](#)).
- Touch-screen panel: Use the opening in the frame door to access the panel. On the home screen, touch the icon that corresponds to the card.

The status LED on the XIP-3901 will flash yellow, and the touch-screen status will be yellow for the XIP-3901.

The panel displays two lines of 16 characters and the following four buttons for navigating the menu:

- [+] [-] Navigate menus and modify values.
- [SEL] Accesses the next menu level. When a parameter value is shown, push this button once to modify the value using the [+] and [-] buttons; push it again to confirm the new value.
- [ESC] Cancels parameter value changes that have not been confirmed and reverts the parameter to its former value.

Returns to the previous menu. In the main menu, [ESC] does *not* exit the menu system. To exit, push the [SELECT] button on the card being controlled.

If no controls are operated for 30 seconds, the controller reverts to its normal standby status, and the selected card's status reverts to its normal operating mode.

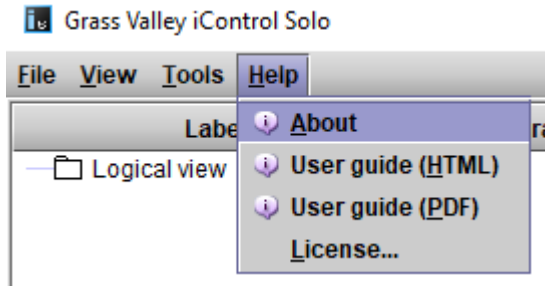
The complete menu structure is shown in [APPENDIX 1 – Local Menu](#).

7 Card Upgrade

The XIP-3901 card upgrade can be made through iControl Solo or through the iControl Appserver.

7.1 Starting iControl Solo

To setup the XIP-3901 card, you must have installed on your PC iControl Solo, version 7.51 or higher. To verify the version of iControl Solo installed on your PC, go to the **Help** menu and select **About**, as shown below:



iControl Solo can be downloaded from the Grass Valley website. See [iControl Solos Software](#).

7.2 Downloading new XIP applications

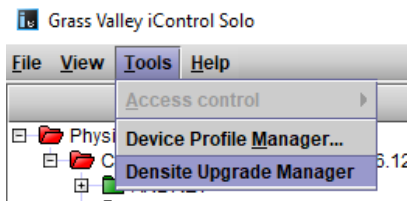
XIP-3901 applications can be downloaded from the GrassValley support site, under **Downloads for Broadcast Products** and look for **XIP-3901 Agile Modular SDI/IP Processing Platform for Densite 3+** to download latest applications.

This is a .ZIP file. Do not unzip the file for the following procedures.

7.3 Installing new applications on the XIP-3901

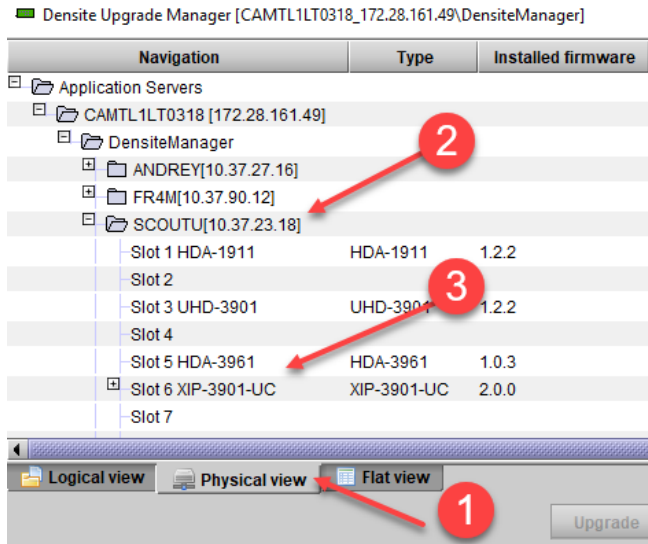
To install a new application on an XIP-3901, proceed as follows:

1. In iControl Solo or in iControl Navigator, go in the **Tools** menu and select **Densite Upgrade Manager**, as shown below:

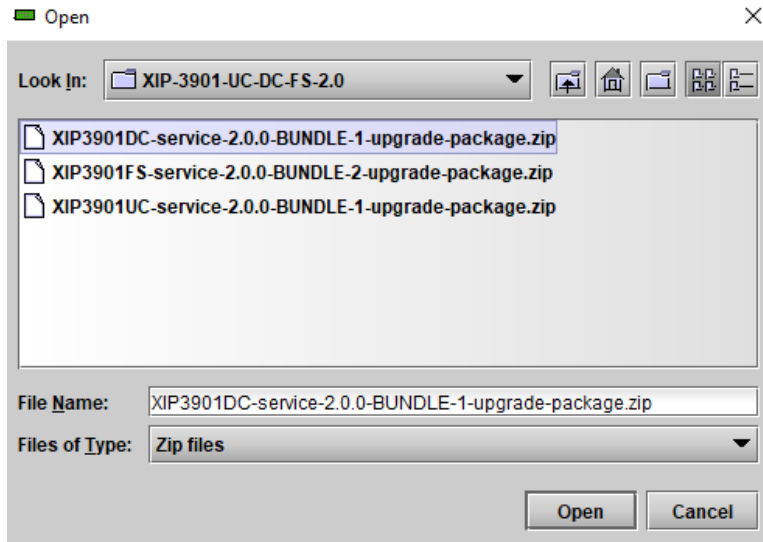


This will start the Densité Upgrade Manager. It may take a few minutes for the frames and cards to populate the window.

In the **Physical View** Tab (1), you will see a list of Densité frames (2), and for each Densité frame is a list of cards installed in the frame's slots (3). You need to expand the tree to see the information, as shown below:

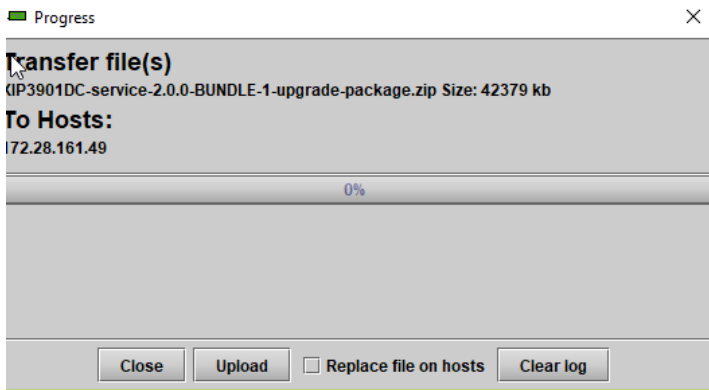


2. Click **Upload files** found at the bottom of the Densité upgrade manager, and in the file browser, select one or more XIP application ZIP files, as shown below. Use <Ctrl> + click to select more than one file.

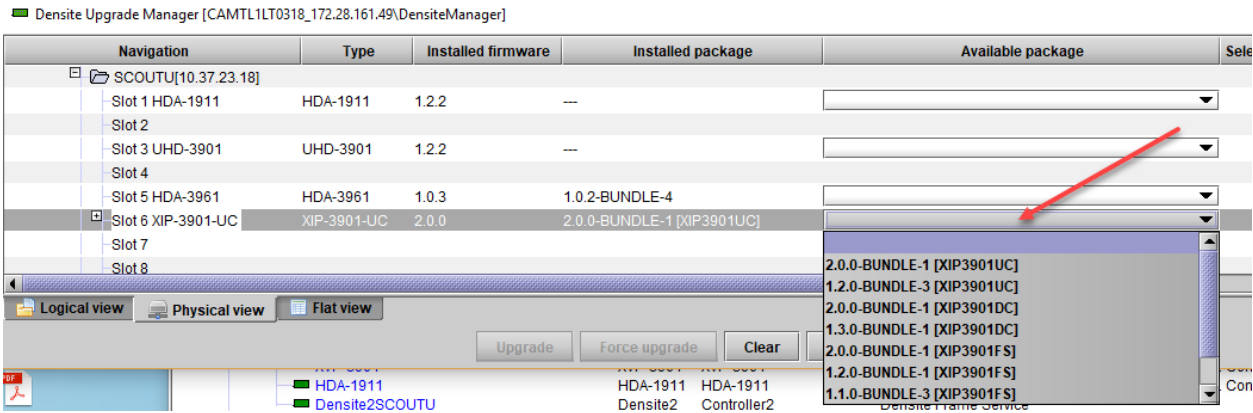


3. Click **Open**.

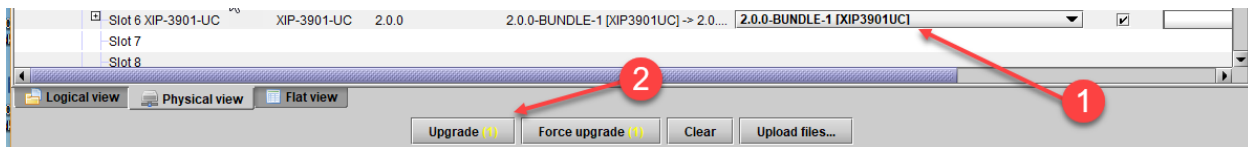
- Click **Upload** in the Progress dialog:



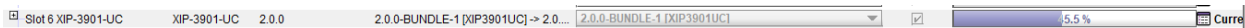
- Once the download of the application(s) has completed, click **Close**.
- Once complete, click **Clear** at the bottom of the Densité Upgrade Manager window.
- Select the application you want to now use on your XIP-3901 card. Click the **Available package** pulldown for the corresponding XIP-3901 card you want to install/update and select the appropriate bundle for it from the list.



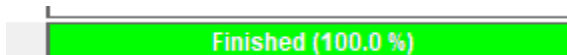
- Click **Upgrade** to launch the card's upgrade process by downloading the firmware into the XIP-3901 card and installing the corresponding application.



The installation progress bar should update, as shown below:



And then it completes.



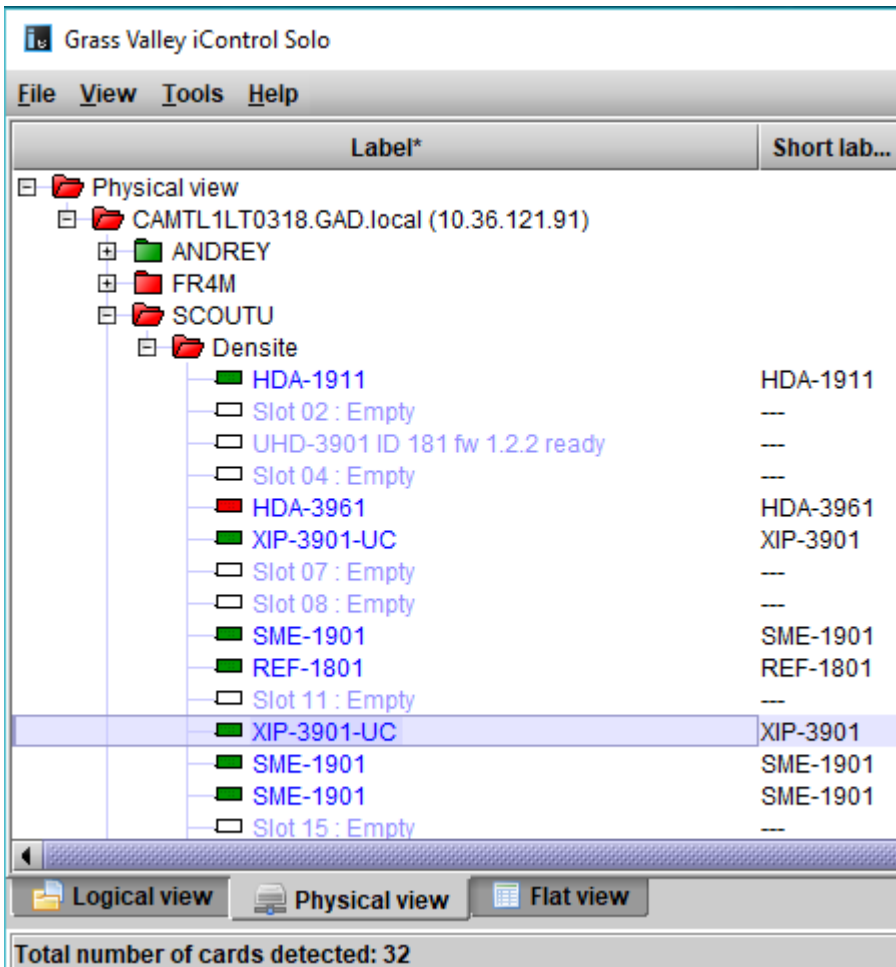
The XIP-3901 card then will disappear for 30 seconds as it will reboot after the upgrade and then it will show the XIP-3901 card with the right firmware and installed package, as show below.

Slot 6 XIP-3901-UC	XIP-3901-UC	2.0.0	2.0.0-BUNDLE-1 [XIP3901UC]
--------------------	-------------	-------	----------------------------

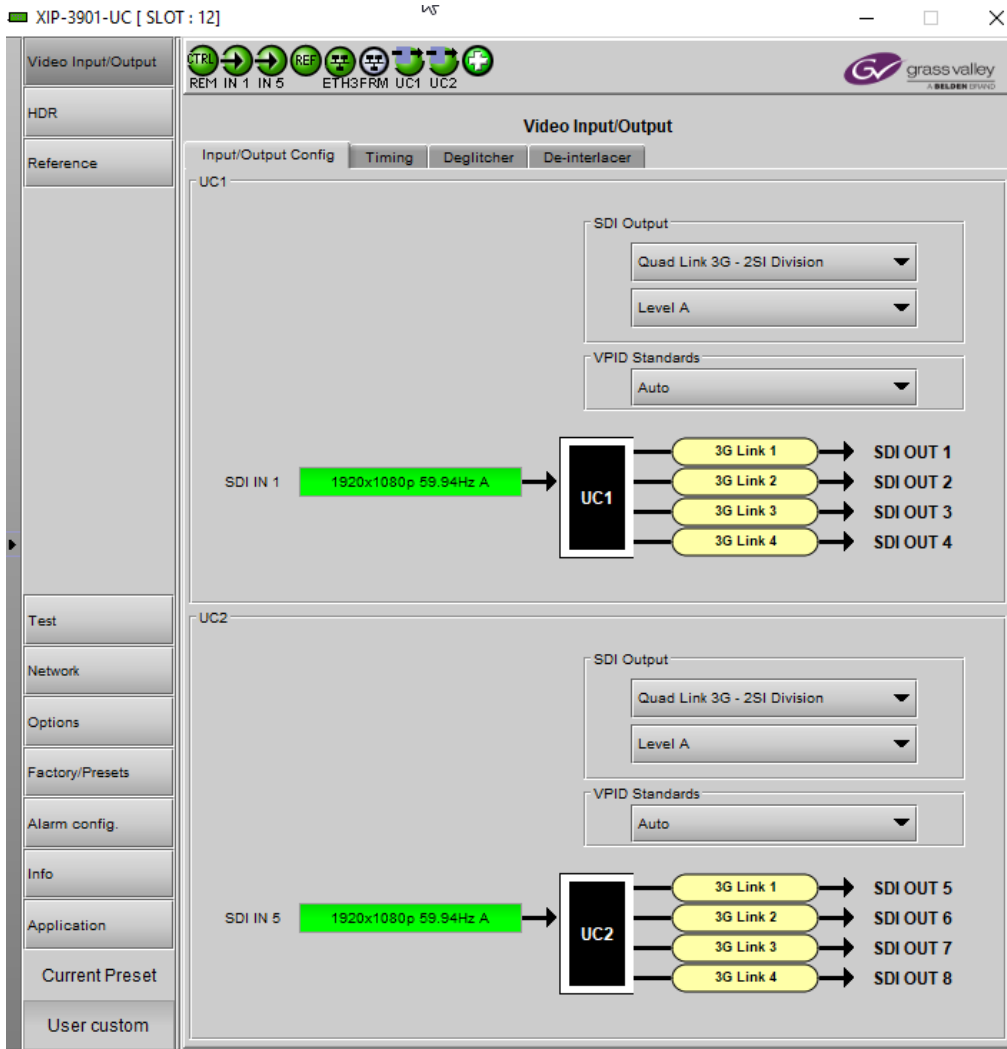
You can use the **Available package** pulldown to activate any other application, at any time. The last installed application will be the current one running on the XIP-3901.

7.4 Opening the XIP-3901 Panel

1. Close the Densité Upgrade Manager and then launch the XIP-3901 application from iControl Solo by double clicking on the XIP-3901-UC application to launch the iControl panel for the card. As shown below, this example shows that the XIP-3901-UC was the last application installed on the card:



The iControl panel for the card then shown.



You can also change the current application in the **Application** panel. See 10.13 Application Panel on page 76.

8 iControl System User Interface

The XIP-3901 applications can be remotely controlled using Grass Valley's iControl system. This manual describes the control panels associated with the XIP-3901 applications and their use. Please consult the iControl User's Guide for information about setting up and operating iControl.

In iControl Navigator or iControl Websites, double-click on the XIP-3901-UC, XIP-3901-DC, or XIP-3901-FSicon (for example, the icon shows XIP-3901 for XIP-3901-UC v1.0) to open the control panel.

The basic window structure is shown in Figure 10. Although the example displayed is from the XIP-3901-UC, the XIP-3901-DC, and XIP-3901-FS interfaces follow the same structure. The window title bar shows the card type and the slot number where the card is installed in its Densité frame.

There are four main sections in the window:

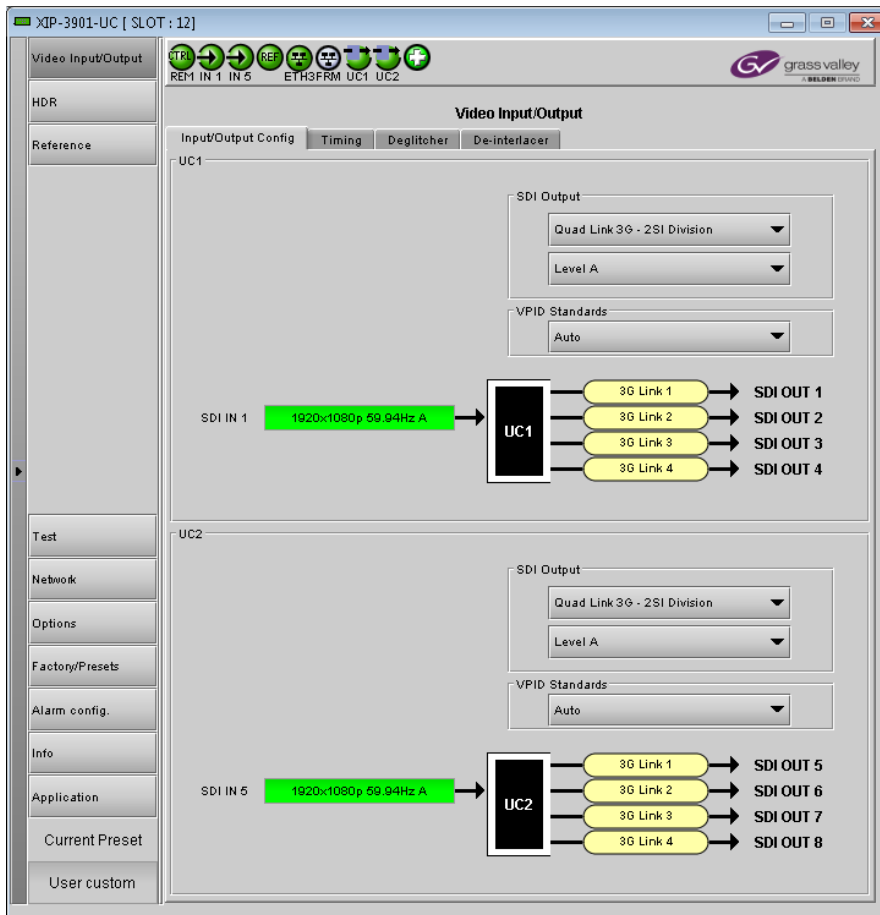


Figure 10– XIP-3901 iControl Graphic Interface (Shown on XIP-3901-UC)

Section 1: The top section displays icons that report different statuses, such as the card communication status, input status, health status, and card operation mode. Mousing over an icon will display a status message with additional information.



Figure 11–XIP-3901-UC Status Icons



Figure 12–XIP-3901-DC Status Icons















Figure 13–XIP-3901-FS Status Icons





Figure 14– XIP-3901 Status Message (mouse over a status icon, shown on XIP-3901-UC)

The table below describes the various iControl status icons that can appear. If more than one interpretation is possible, read the error message in the iControl window to see which applies.

Manual Card Configuration	
	Remote card control is activated. The iControl interface can be used to operate the card.
	Local card control is activated. The card is being controlled using the Densité frame control panel, as described in 6 Local Control Using the Densité Frame Control Panel . Any changes made using the iControl interface will have no effect on the card.
SDI IN Status (UC)	
	SDI is present and valid. The video format is indicated when there are no errors.
	SDI not present; or SDI invalid; or SDI unsupported; or Reference mismatch.

SDI IN Status (DC and FS only)	
 (green)	All SDI inputs are present and valid. At least one SDI input is reporting an error. See the diagram in the Input/Output Config tab to diagnose the issue.
 (red)	At least one SDI input is reporting an error. See the diagram in the Input/Output Config tab to diagnose the issue.
Reference Status (UC, DC, and FS only)	
 (green)	Reference on both channels is locked.
 (red)	Reference on at least one channel is not locked. See 10.6 Reference Panel for more details on the problem(s).
Network Status (ETH3/FRM)	
 (green)	Network linkup and active.
 (red)	No network link (port down).
 (gray)	Network port is disabled.
 (yellow)	Network connections in progress.
Operating Mode	
 (green)	Operating mode: Process
 (red)	Operating mode: Color Bars & Tone

Health Monitoring	
 (green)	Hardware OK.
 (red)	Hardware failure detected. If this icon is flashing red, call Technical Support.

If there is an error, the error status message will appear in the message area.

- If there are multiple errors, the error messages cycle so that each message can be seen.
- The icon for the status or error message being shown will be highlighted in mauve.

Section 2: The left portion of the window contains buttons for each individual panel, which are highlighted when they are selected. Section 3 then displays the selected panel.



Figure 15– Buttons for Each Individual Panel

Section 3: This main section displays the panel selected in Section 2. It may contain multiple tabs to access any appropriate sub-panel.

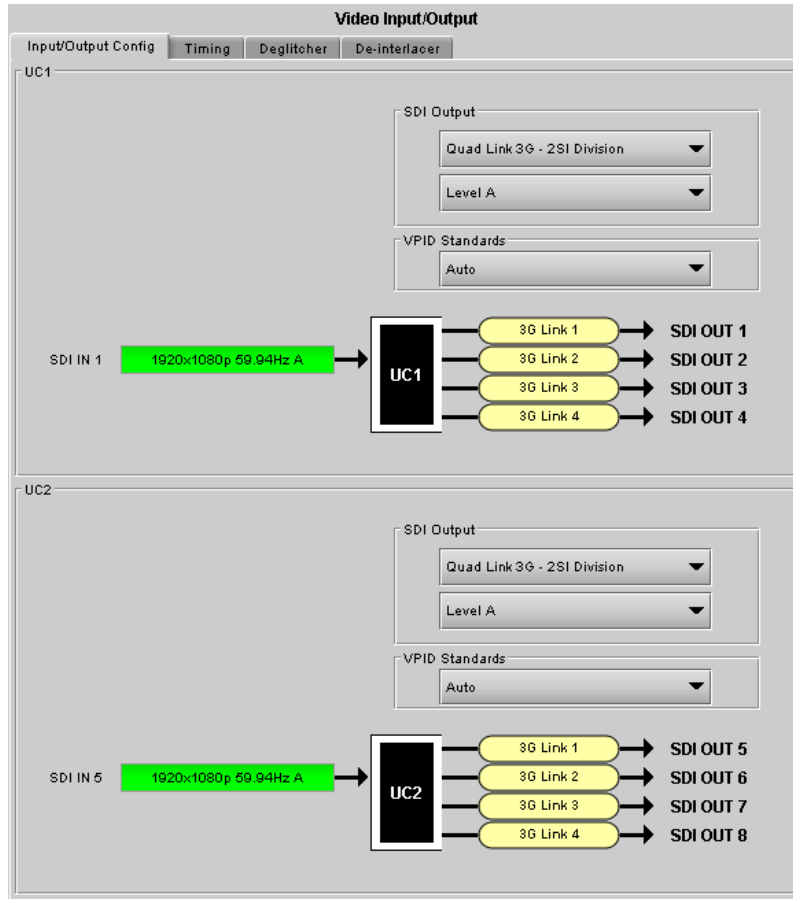


Figure 16– Panel Display (Shown on XIP-3901-UC)

Section 4: The lower left corner of the window identifies the preset currently in use, “User custom” if none is applicable, or “Factory default” when the card is currently using its factory-default settings.

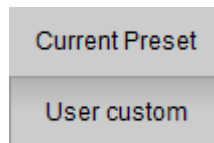


Figure 17–Current Preset or User Custom

9 Card Upgrade

When adding a new XIP-3901 card into a Densité frame, you must first install the iControl application bundle. iControl provides a configuration interface for the XIP-3901 card and through the DUM (Densité Update Manager) it allows you to upgrade the card's firmware to the latest version.

To install iControl, see the iControl Release Notes. For more information about the Densité Update Manager, see the iControl User Guide. These documents are available for download from the Grass Valley website. Contact Grass Valley Technical Support for the latest XIP-3901-UDC-S1 firmware version. See Contact Us on page 82.

10 Configuring the XIP-3901-UC / -DC / -FS Applications Using iControl

This section describes the control panels associated with the XIP-3901-UC / -DC / -FS applications and their use.

10.1 Video Input/Output Panel (XIP-3901-UC)

10.1.1 Input/Output Config Tab

This panel allows you to configure the settings for the two upconverters. Each can be configured independently.

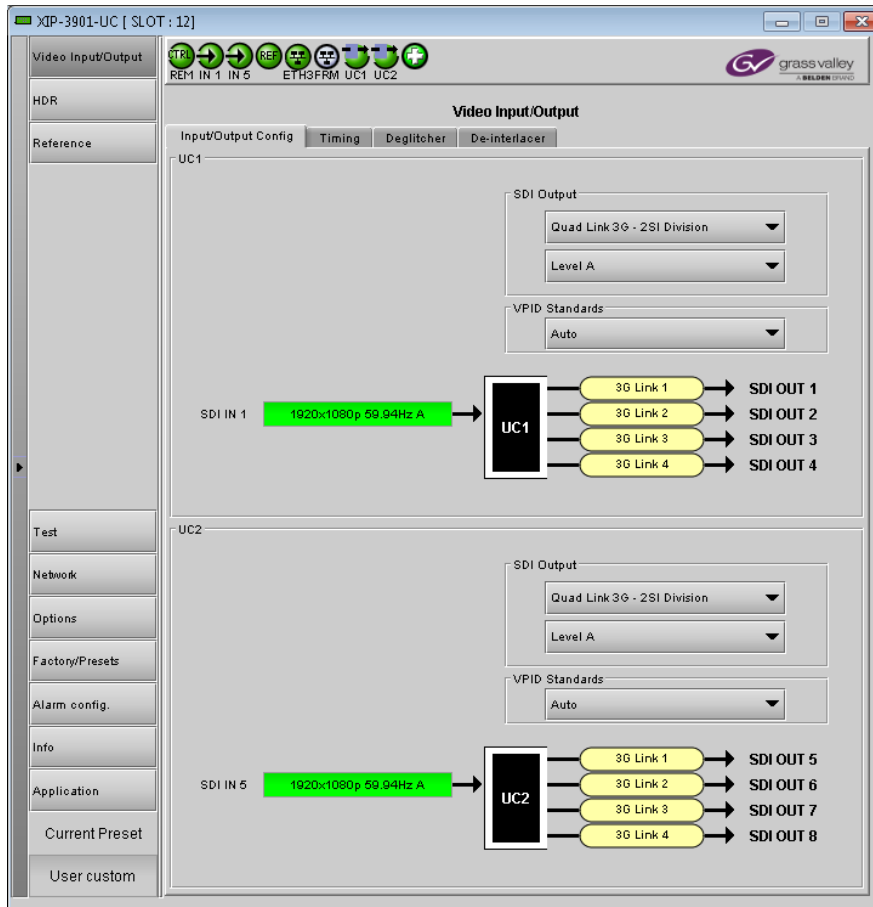


Figure 18–Video I/O Config

Use the pulldown menus to configure these parameters:

Parameter		Settings	Note
SDI Output	Transport & 2160-Line Data Mapping (on Quad Link 3G)	Quad Link 3G – 2SI Division (default) Quad Link 3G – Square Division 12G 3G	1
	3G Mapping	Level A (default) Level B Dual Link	3
VPID Standards		Auto (default) 3 Gb/s Legacy (SMPTE 425-1)	2

Note 1: For each upconverter, you must select the format of the SDI output transport using the SDI Output pulldown menu. For the Quad Link 3G SDI Transport setting, you must also select which 2160-Line Data Mapping to use (Square Division or 2SI Division). The choice will depend on the format used by the destination equipment.

- Quad Link 3G – Square Division: The 4K image is split into four full-resolution quadrants, each sent on a single 3G link.
- Quad Link 3G – 2SI Division: The 4K image is sub-sampled into four full-frame images, each at half the vertical and horizontal resolution.
- 12G: The 4K image is sent on a single 12G link.
- 3G: The image is sent on a single 3G Link.

Note 2: Usually, 2-Sample Interleave outputs have a different VPID on each link, per SMPTE 425-5. Some downstream equipment may not support this standard, so the use of SMPTE 425-1 VPIDs can be forced by selecting 3Gb/s legacy in the VPID Standards pulldown menu. VPID Standards settings are ignored when the SDI Output is set to 3G or 12G.

VPID Standards	Quad Link 3G	
	Square Division	2SI Division
Auto	SMPTE 425-1	SMPTE 425-5
3Gb/s legacy	SMPTE 425-1	SMPTE 425-1

Note 3: The XIP-3901-UC supports two of the mappings of video into the serial digital interface defined by SMPTE 424M. 3G Mapping settings are ignored when the SDI Output is set to 12G.

- The Level A format is the direct mapping of uncompressed 1080p (up to 60 fps) video into a serial digital interface at the nominal 3 Gb/s.
- The Level B-DL (DualLink) format is the mapping of DualLink HD-SDI/SMPTE 372M (for example, 1080p up to 60 fps) in a single serial digital interface at the nominal 3 Gb/s.

A diagram of the upconversion process is displayed underneath the settings for each upconverter. Each link will be either green (no error) or red (error).

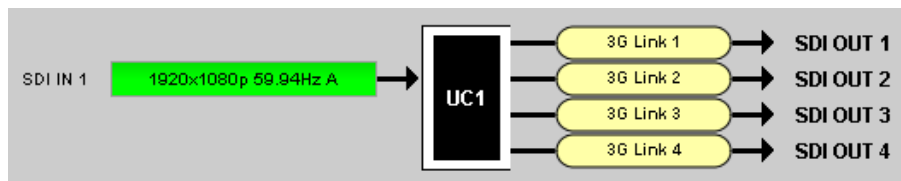


Figure 19– Upconversion Diagram

10.1.2 Timing Tab

For each upconverter, you can adjust the timing relative to the reference. Use the slider or type a value into the data box on the right of the slider.

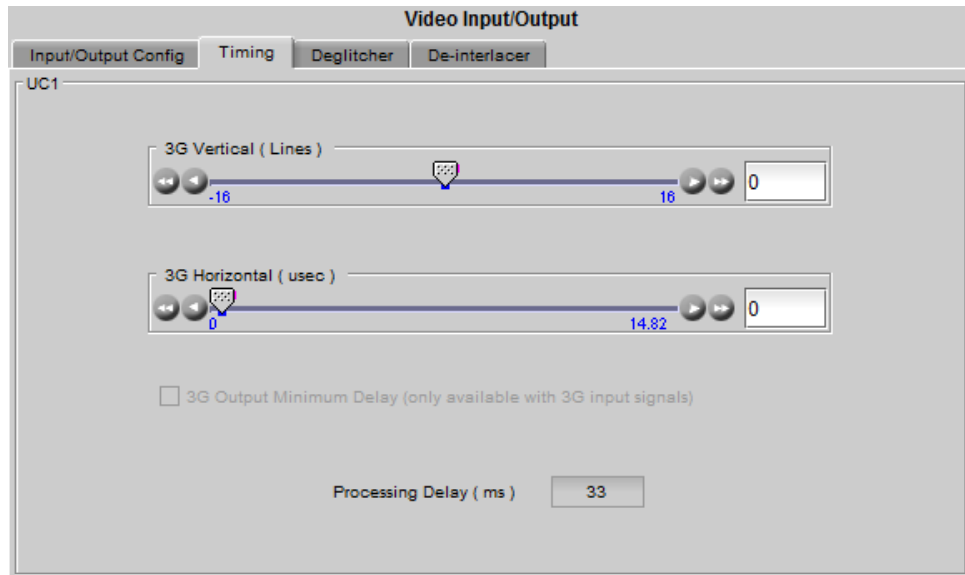


Figure 20–Video I/O Timing

The sliders can be adjusted as follows:

Adjustment	Range
Vertical (lines)	-16 to +16
Horizontal (µsec)	Up to 1 line: 0 to 14.82µsec (59 Hz) 0 to 17.77µsec (50 Hz)

For a 3G SDI Output, the 3G Output Minimum Delay setting can be enabled. In this case, the reference source will be forced to Input for this channel and the user settings for the reference source will be ignored (see [10.6 Reference Panel](#) for more information). The 3G Mapping settings will also be ignored. If Level A format is received, the card will output Level A. If Level B DualLink format is received, the card will output Level B DualLink. The following features are also disabled:

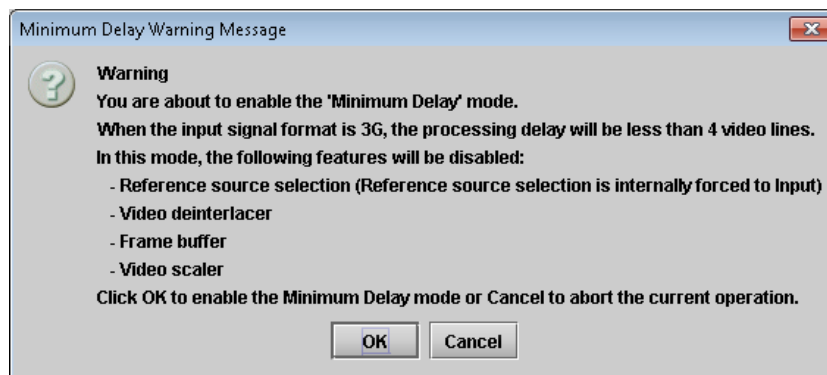


Figure 21–Disabled Features

This section also displays the Processing Delay in milliseconds (ms) for each channel so you can manage the processing delay on your system.

Min. Delay	Ref	SDI Input	SDI Output	Processing Delay			
				Async or Isochrone Inputs		Synced & Phase-Aligned Inputs	
				Minimum	Maximum	59Hz	50Hz
OFF	Input	1080i	ALL	2 fields	2 fields	33 ms	40 ms
		720p, 1080p	ALL	2 frames	2 frames	33 ms	40 ms
	URS, External	1080i	ALL	12 ms + 1 field	12 ms + 3 fields	33 ms	40 ms
		720p, 1080p	ALL	12 ms + 1 frame	12 ms + 2 frames	33 ms	40 ms
ON	Input	1080p	1080p	< 4 lines	< 4 lines	< 4 lines	< 4 lines

The XIP-3901 has an integrated frame sync that supports synchronous and asynchronous SDI input signals. The input signals will be synchronized and realigned to either the URS or External Reference.

The frame sync behaves like a frame buffer. It also supports frame skips/repeats in the case of an asynchronous SDI input. When an input error occurs, it freezes to the last valid field/frame.

Min. Delay	Ref	Signal	SDI Input	SDI Output	Skip/Repeat Period	Freeze on Input Error		
OFF	Input	ALL	ALL	ALL	N/A	None		
	URS, External	Video	HD/1080i	ALL	ALL	2 fields	Last valid field	
			HD/720p	ALL	ALL	1 frame	Last valid frame	
			3G Level A	ALL	ALL	1 frame	Last valid frame	
			3G Level B DL	12G	ALL	ALL	1 frame	Last valid frame
				3G Level A	ALL	ALL	1 frame	Last valid frame
				Quad Link 3G Level A	ALL	ALL	1 frame	Last valid frame
				3G Level B DL	ALL	ALL	2 frames	Last valid frame
			Quad Link 3G Level B DL	ALL	ALL	2 frames	Last valid frame	
	Audio	PCM	ALL	ALL	N/A	Tracking during 15 seconds per frame	Muted	
		Non-PCM	ALL	ALL	N/A	Instant catch-up	Muted	
Metadata	ALL	ALL	ALL	N/A	Lost when skipped, duplicated when repeated	Blanked		
ON	ALL	ALL	ALL	ALL	N/A	None		

10.1.3 Deglitcher Tab

For each upconverter, select the appropriate deglitcher mode (ON or OFF) using the pulldown menu.

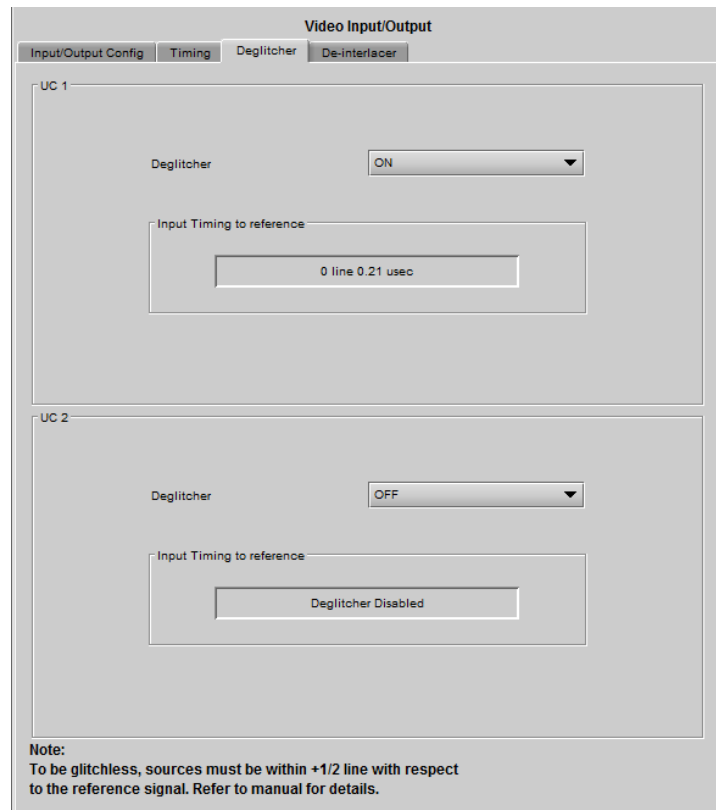


Figure 22– Deglitcher Tab

When the deglitcher is enabled, the card supports a hotswitch between two signals (either on the same input, or between the card's two inputs) without producing a freeze on the frame sync, and without producing artifacts on the output.

The deglitcher must be disabled when the input is asynchronous to the reference. Otherwise, it will create audio and video glitches at the output.

For this mode to function correctly, the following requirements must be met:

- The two inputs must be synchronized to the reference
- They must be phased within one line of each other
- They must be phased to within +/- ½ line of the HREF of the reference signal

The offset from the VREF can be variable, but a distance of greater than 10 lines could create an artifact in the active video. If the two signals are more than one line apart, a vertical jump will occur at the moment of switching that is proportional to the number of vertical lines of offset between the two signals. This will last for only one frame. For more information about using clean switch regions to perform glitch-free switches, see [10.4 Clean Switch Regions and Examples](#).

The Input Timing to Reference box reports any difference in timing between the input and reference when the transition occurs. When the deglitcher is disabled, it will display "Deglitcher Disabled". When the deglitcher is enabled, it can display one of the following error messages in red:

- Missing Reference: The External or URS reference source is missing.
- Locked on Input: The reference source is set to Input.
- Video Error: There is an error with the input.

10.1.4 De-interlacer Tab

Each upconverter has its own de-interlacer. The Film Mode and Video Over Film settings can either be set to On or Off. By default, both are set to On for optimal performance.

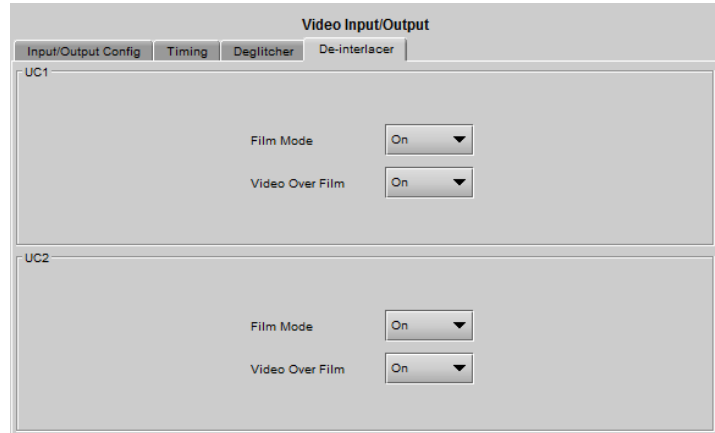


Figure 23–Video I/O De-interlacer

Property	Description
Film Mode	Some interlaced video sources are film-based, originating from 24p film images. When Film Mode is on, the de-interlacer will monitor the input for this type of source. When detected, it will merge the fields to recreate the original 24p image, thereby avoiding de-interlacer artifacts prior to scaling and upconversion. Film detection is provided for 3:2, 2:2 (59 Hz and 50 Hz sources) and 5:5 sequences.
Video Over Film	Video Over Film is available only when Film Mode is enabled. When Video Over Film is on, the de-interlacer will detect video over film content and bypass field-merging on certain video regions such as scrolling video characters over an entire film frame, thereby preventing any unwanted combing effects.

10.2 Video Input/Output Panel (XIP-3901-DC)

10.2.1 Input/Output Config Tab

This panel allows you to configure the settings for the two downconverters. Each can be configured independently.

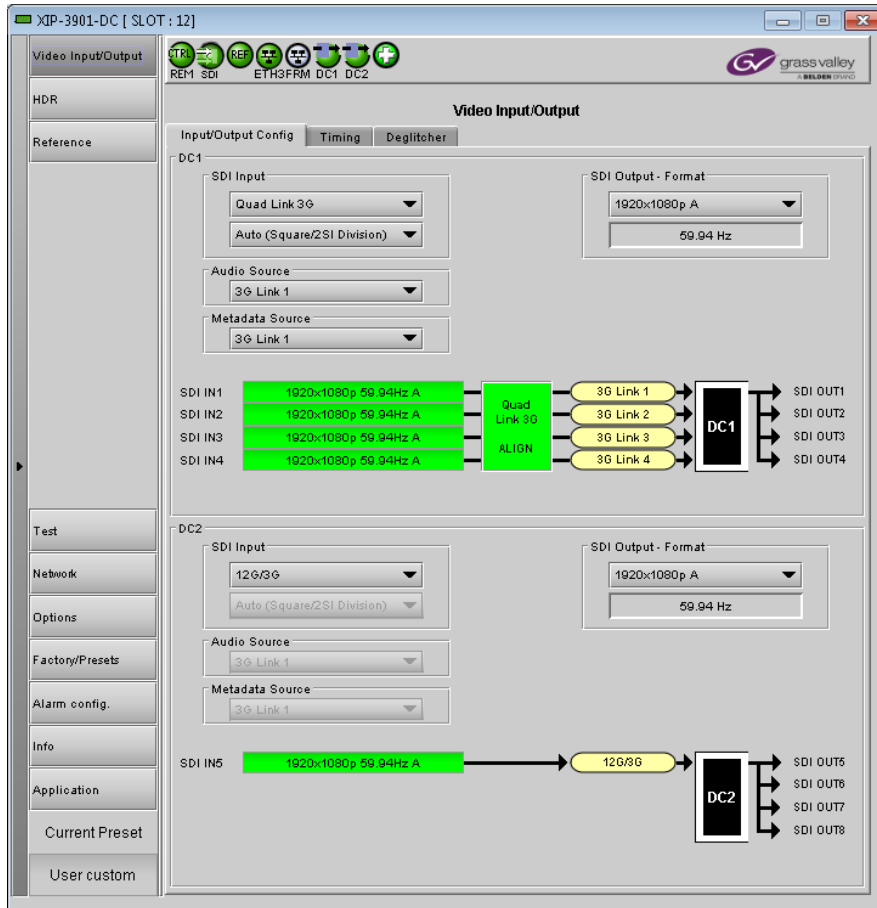


Figure 24– Video I/O Config

Use the pulldown menus to configure these parameters:

Parameter		Settings	Note
SDI Input	SDI Transport	Quad Link 3G (default) 12G/3G	1
	2160-Line Data Mapping	Auto (Square/2SI Division) (default) 2SI Division Square Division	2
Audio Source		3G Link 1 to 4. Set the SDI input link to receive the audio source. Default value is 3G Link 1.	–
Metadata Source		3G Link 1 to 4. Set the SDI input link to receive the metadata source. Default value is 3G Link 1.	–
SDI Output – Format	SDI Output – Resolution	1920x1080p A (default) 1920x1080p B DL 1920x1080i 1280x720p	3

Note 1: For each downconverter, you must select the format of the SDI input transport using the SDI Input pulldown menu. The choice will depend on the format used by the origin equipment.

- Quad Link 3G: The 4K UHD image is split into four full-resolution quadrants, each received on a single 3G link.
- 12G/3G: The 4K UHD image is received on a single 12G or the HD image on a 3G link.

Note 2: For Quad Link 3G SDI Transport, you must also select how 2160-Line Data Mapping is detected.

- Auto (Square/2SI Division): Automatically detects the mapping type based on the incoming VPID on the first link (this setting may not be able to automatically detect certain legacy signals).
- 2SI Division: Assumes 2SI Division regardless of the incoming VPID.
- Square Division: Assumes Square Division regardless of the incoming VPID.

2160-Line Data Mapping settings are ignored when the SDI Input is set to 12G/3G.

Note 3: The frame rate (59.94 Hz or 50 Hz) of the selected SDI output resolution is reported underneath the SDI Output - Resolution menu.

A diagram of the downconversion process is displayed underneath the settings for each downconverter. The status for each input SDI will be either green (no error) or red (error). In the event of an error, you can mouse over this field to display a tooltip with more details.

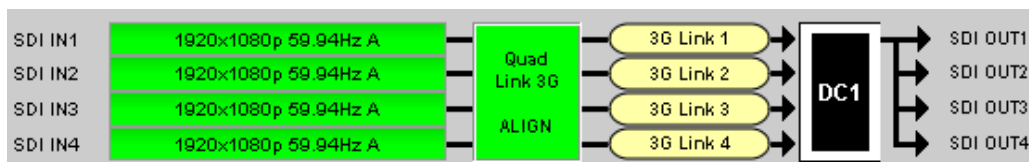


Figure 25–Downconversion Diagram

The possible errors are as follows:

- No Carrier: No SDI Carrier is detected.
- No Error: No errors are detected.
- Video/TRS Error: The received video has TRS errors.

- Not Supported: The received video format is not supported.
- Reference Mismatch: The received video does not match the reference frame rate.
- Wrong Link: Received the wrong Quad Link 3G link on 2SI Division.
- Quad Link 3G Error: The received Quad Link 3G has different video formats.
- Unexpected Format: Did not receive the video format selected by the user.

Quad Link 3G ALIGN monitors the timing of the four link inputs. The timing difference between the Quad Link 3G links shall not exceed 400 ns, as per SMPTE ST-425-5.

Status	Quad Link 3G ALIGN	
Gray	No carrier on Quad Link 3G links	
Green	Timing difference between Quad Link 3G links does not exceed the internal buffer	
Red	Timing difference between Quad Link 3G links exceeds the internal buffer	

10.2.2 Timing Tab

For each downconverter and output resolution, you can adjust the timing relative to the reference. The vertical setting applies to all output formats, whereas the horizontal settings are specific to individual output formats. To adjust the timing, use the slider or type a value into the data box on the right of the slider.

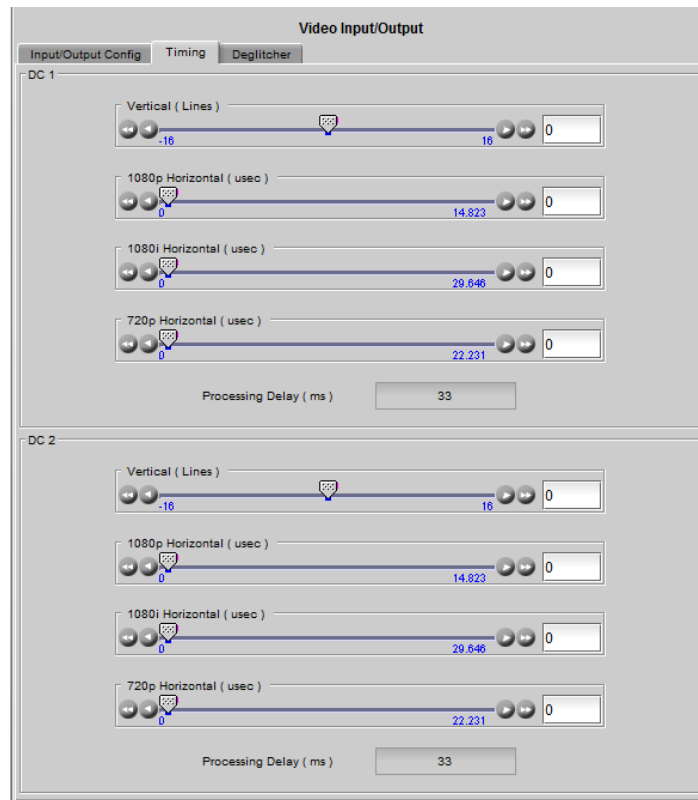


Figure 26– Video I/O Timing

The sliders can be adjusted as follows:

Adjustment	Range (50 Hz)	Range (59 Hz)
Vertical (Lines)	-16 to +16	-16 to +16
1920x1080p (A and B DL) Horizontal (µsec)	0 to 17.771 µsec	0 to 14.825 µsec
1920x1080i Horizontal (µsec)	0 to 35.542 µsec	0 to 29.646 µsec
1280x720p Horizontal (µsec)	0 to 26.653 µsec	0 to 22.231 µsec

This section also displays the Processing Delay in milliseconds (ms) for each channel so you can manage the processing delay on your system. For more details about processing delay, see the table below.

Ref	SDI Input	SDI Output	Processing Delay			
			Async or Isochrone Inputs		Synced & Phase-Aligned Inputs	
			Min	Max	59Hz	50Hz
Input	ALL	ALL	2 frames	2 frames	33 ms	40 ms
URS, External	3G Level A	ALL	12 ms	12 ms + 1 frame	17 ms	20 ms
	3G Level B DL	HD	12 ms	12 ms + 1 frame	17 ms	20 ms
		3G Level A	12 ms	12 ms + 1 frame	17 ms	20 ms
	3G Level B DL	3G Level B DL	12 ms	12 ms + 2 frames	33 ms	40 ms
	12G	ALL	12 ms + 1 frame	12 ms + 2 frames	33 ms	40 ms
	Quad Link 3G Level A	ALL	12 ms + 1 frame	12 ms + 2 frames	33 ms	40 ms
	Quad Link 3G Level B DL	HD	12 ms + 1 frame	12 ms + 2 frames	33 ms	40 ms
3G Level A		12 ms + 1 frame	12 ms + 2 frames	33 ms	40 ms	
3G Level B DL		12 ms + 2 frames	12 ms + 4 frames	67 ms	80 ms	

The XIP-3901 has an integrated frame sync that supports synchronous and asynchronous SDI input signals. The input signals will be synchronized and realigned to either the URS or External Reference.

The frame sync behaves like a frame buffer. It also supports frame skips/repeats in the case of an asynchronous SDI input. When an input error occurs, it freezes to the last valid field/frame.

Ref	Signal	SDI Input	SDI Output	Skip/Repeat Period	Freeze on Input Error
Input	ALL	ALL	ALL	N/A	None
URS, External	Video	12G,	ALL	1 frame	Last valid frame
		3G Level A	ALL	1 frame	Last valid frame
		Quad Link 3G Level A	ALL	1 frame	Last valid frame
		3G Level B DL	3G Level A	1 frame	Last valid frame
			3G Level B DL	2 frames	Last valid frame
		Quad Link 3G Level B DL	3G Level A	1 frame	Last valid frame
	3G Level B DL		2 frames	Last valid frame	
	Audio	PCM	N/A	Tracking during 15 seconds per frame	Muted
		Non-PCM	N/A	Instant catch-up	Muted
Metadata	ALL	N/A	Lost when skipped, duplicated when repeated	Blanked	

10.2.3 Deglitcher Tab

For each downconverter, select the appropriate deglitcher mode (ON or OFF) using the pulldown menu.

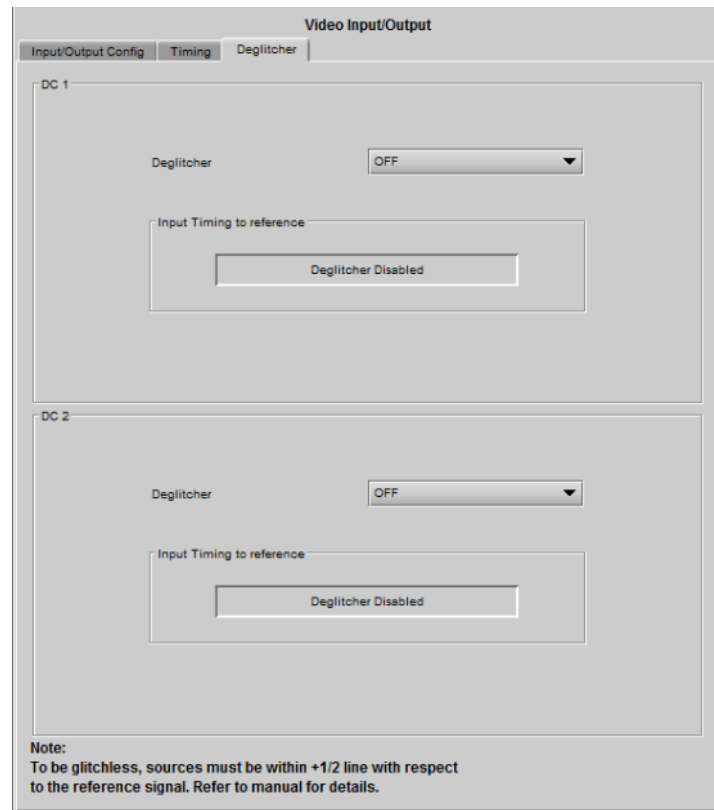


Figure 27– Deglitcher Tab

When the deglitcher is enabled, the card supports a hot switch between two signals (either on the same input, or between the card's two inputs) without producing a freeze on the frame sync, and without producing artifacts on the output.

The deglitcher must be disabled when the input is asynchronous to the reference. Otherwise, it will create audio and video glitches at the output.

For this mode to function correctly, the following requirements must be met:

- The two inputs must be synchronized to the reference
- They must be phased within one line of each other
- They must be phased to within $\pm 1/2$ line of the HREF of the reference signal

The offset from the VREF can be variable, but a distance of greater than 10 lines could create an artifact in the active video. If the two signals are more than one line apart, a vertical jump will occur at the moment of switching that is proportional to the number of vertical lines of offset between the two signals. This will last for only one frame. For more information about using clean switch regions to perform glitch-free switches, see [10.4 Clean Switch Regions and Examples](#).

The Input Timing to Reference box reports any difference in timing between the input and reference when the transition occurs. Since the XIP-3901-DC supports multiple links, the measurement displayed is taken from the first link (shown as SDI IN 1 in the Input/Output Config tab). When the deglitcher is disabled, it will display "Deglitcher Disabled". When the deglitcher is enabled, it can display one of the following messages in red:

- Missing Reference: The External or URS reference source is missing.
- Locked on Input: The reference source is set to Input.
- Video Error: There is an error with the input.

10.3 Video Input/Output Panel (XIP-3901-FS)

10.3.1 Input/Output Config Tab

This panel allows you to configure the settings for the two synchronizers. Each can be configured independently.

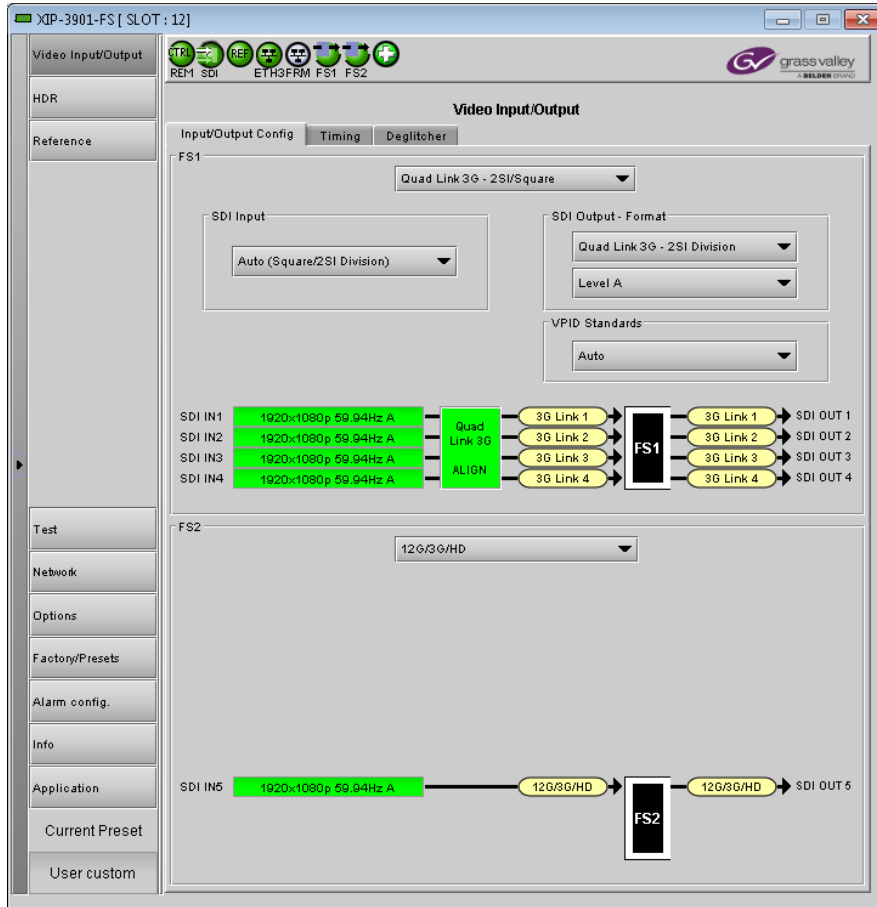


Figure 28– Video I/O Config

Use the topmost pulldown menu to select an operation mode. Depending on the selected mode, you may also need to select an SDI input format, SDI output format, and/or VPID standards.

Operation Mode	Setting Type	Settings	Note
12G/3G/HD	N/A	N/A	N/A
Quad Link 3G (default)	N/A	N/A	N/A
3G Level A/B DL	SDI Output – Format (3G Mapping)	Level A (default) Level B Dual Link	3
Quad Link 3G - 2SI/Square	SDI Input (2160p Data Mapping)	Auto (Square/2SI Division) (default) 2SI Division Square Division	1
	SDI Output - Format (2160p Data Mapping)	Quad Link 3G - Square Division Quad Link 3G - 2SI Division (default)	2
	SDI Output - Format (3G Mapping)	Level A (default) Level B Dual Link	3
	VPID Standards *only active for 2SI Division	Auto (default) 3Gb/s legacy (SMPTE 425-1)	4
Quad Link 3G to 12G	SDI Input (2160p Data Mapping)	Auto (Square/2SI Division) (default) 2SI Division Square Division	1
12G to Quad Link 3G	SDI Output - Format (2160p Data Mapping)	Quad Link 3G - Square Division Quad Link 3G - 2SI Division (default)	2
	SDI Output - Format (3G Mapping)	Level A (default) Level B Dual Link	3
	VPID Standards *only active for 2SI Division	Auto (default) 3Gb/s legacy (SMPTE 425-1)	4

Note 1: Using the Auto setting, the XIP-3901-FS can automatically detect whether the input format is Square Division or 2SI Division. You can also choose to consider the input as either Square Division or 2SI Division.

Note 2: For the Quad Link 3G SDI Output - Format setting, you must select which 2160p Data Mapping to use (Square Division or 2SI Division). The choice will depend on the format used by the destination equipment.

- Quad Link 3G – Square Division: The 4K image is split into four full-resolution quadrants, each sent on a single 3G link.
- Quad Link 3G – 2SI Division: The 4K image is sub-sampled into four full-frame images, each at half the vertical and horizontal resolution.

Note 3: The XIP-3901-FS supports two of the mappings of video into the serial digital interface defined by SMPTE 424M. 3G Mapping settings are ignored when the SDI Output is set to 12G.

- The Level A format is the direct mapping of uncompressed 1080p (up to 60 fps) video into a serial digital interface at the nominal 3 Gb/s.
- The Level B DL (Dual Link) format is the mapping of Dual Link HD-SDI/SMPTE 372M (for example, 1080p up to 60 fps) in a single serial digital interface at the nominal 3 Gb/s.

Note 4: Usually, 2-Sample Interleave outputs have a different VPID on each link, per SMPTE 425-5. Some downstream equipment may not support this standard, so the use of SMPTE 425-1 VPIDs can be forced by selecting 3Gb/s legacy in the VPID Standards pulldown menu. VPID Standards settings are ignored when the SDI Output is set to 3G or 12G.

VPID Standards	Quad Link 3G	
	Square Division	2SI Division
Auto	SMPTE 425-1	SMPTE 425-5
3 Gb/s legacy	SMPTE 425-1	SMPTE 425-1

A diagram of the synchronization process is displayed underneath the settings for each synchronizer. The status for each input SDI will be either green (no error) or red (error). In the event of an error, you can mouse over this field to display a tooltip with more details.

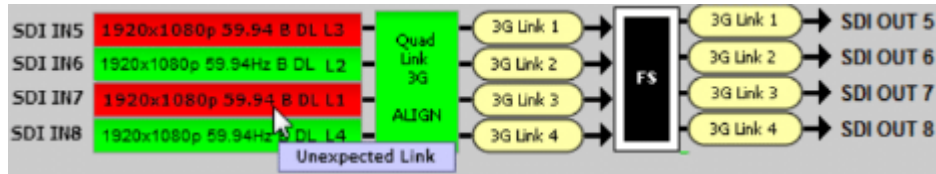


Figure 29—Synchronization Diagram

The possible errors are as follows:

- No Carrier: No SDI Carrier is detected.
- No Error: No errors are detected.
- Video/TRS Error: The received video has TRS errors.
- Not Supported: The received video format is not supported.
- Reference Mismatch: The received video does not match the reference frame rate.
- Wrong Link: Received the wrong Quad Link 3G link on 2SI Division.
- Quad Link 3G Error: The received Quad Link 3G has different video formats.
- Unexpected Format: Did not receive the video format selected by the user.

Quad Link 3G ALIGN monitors the timing of the four link inputs. The timing difference between the Quad Link 3G links shall not exceed 400 ns, as per SMPTE ST-425-5.

Status	Quad Link 3G ALIGN
Gray	No carrier on Quad Link 3G links
Green	Timing difference between Quad Link 3G links does not exceed the internal buffer
Red	Timing difference between Quad Link 3G links exceeds the internal buffer

10.3.2 Timing Tab

For each synchronizer and output resolution, you can adjust the timing relative to the reference. The vertical setting applies to all output formats, whereas the horizontal settings are specific to individual output formats. To adjust the timing, use the slider or type a value into the data box on the right of the slider.



Figure 30– Video I/O Timing

The sliders can be adjusted as follows:

Adjustment	Range (50 Hz)	Range (59 Hz)
Vertical (Lines)	-16 to +16	-16 to +16
1920x1080p (A and B DL) Horizontal (μsec)	0 to 17.771 μsec	0 to 14.825 μsec
1920x1080i Horizontal (μsec)	0 to 35.542 μsec	0 to 29.646 μsec
1280x720p Horizontal (μsec)	0 to 26.663 μsec	0 to 22.231 μsec
Additional Frame Delay	0 to 10	0 to 10

Additional frame delay is usually selected in steps of one frame, but some exceptions exist for 1080p B DL where you can only select frames in multiples of two. The following table lists the number of frame steps for each combination of operation modes and SDI inputs and outputs.

Operation Mode	SDI Input	SDI Output	Frame Steps
12G/3G/HD	1080p A, 1080i, 720p, 2160p	N/A	1
	1080p B DL	N/A	2
Quad Link 3G	Quad Link 3G Level A	N/A	1
	Quad Link 3G Level B DL	N/A	2
3G Level A/B DL	1080p A	1080p A	1
		1080p B DL	1
	1080p B DL	1080p A	1
		1080p B DL	2
Quad Link 3G - 2SI/Square	Quad Link 3G Level A	1080p A	1
		1080p B DL	1
	Quad Link 3G Level B DL	1080p A	1
		1080p B DL	2
Quad Link 3G to 12G	Quad Link 3G Level A, Quad Link 3G Level B DL	2160p	1
12G to Quad Link 3G	2160p	1080p A	1
		1080p B DL	1

This section also displays the Processing Delay in milliseconds (ms) for each channel so you can manage the processing delay on your system. For more details about processing delay, see the tables below for the various operation modes.

12G/3G/HD and Quad Link 3G

Min. Delay	Ref	Operation Mode	SDI Input (SDI output = SDI input)	Processing Delay				
				Async or Isochrone Inputs		Synced & Phase-Aligned Inputs		
				Min.	Max.	59 Hz	50Hz	
OFF	Input	ALL	ALL	2 frames	2 frames	33 ms	40 ms	
			12G/3G/HD	12G, 3G Level A	3 ms	3 ms + 1 frame	17 ms	20 ms
				HD	3 ms	3 ms + 2fields	33 ms	40 ms
	3G Level B DL	3 ms		3 ms + 2 frames	33 ms	40 ms		
	Quad Link 3G	Quad Link 3G Level A	3 ms	3 ms + 1 frame	17 ms	20 ms		
		Quad Link 3G Level B DL	3 ms	3 ms + 2 frames	33 ms	40 ms		
ON		Input	ALL	HD	< 3 lines	< 3 lines	< 3 lines	< 4 lines
3G Level A	< 3 lines			< 3 lines	< 3 lines	< 3 lines		
3G Level B DL	< 6 lines			< 6 lines	< 6 lines	< 6 lines		
12G	< 4 lines			< 4 lines	< 4 lines	< 4 lines		
2SI Quad Link 3G Level A	< 4 lines			< 4 lines	< 4 lines	< 4 lines		
2SI Quad Link 3G Level B DL	< 7 lines			< 7 lines	< 7 lines	< 7 lines		
SQ Quad Link 3G Level A	< 3 lines			< 3 lines	< 3 lines	< 3 lines		
SQ Quad Link 3G Level B DL	< 6 lines			< 6 lines	< 6 lines	< 6 lines		

3G Level A/B DL

Ref	SDI Input	SDI Output	Processing Delay			
			Async or Isochrone Inputs		Synced & Phase-Aligned Inputs	
			Min.	Max.	59 Hz	50Hz
Input	ALL	ALL	2 frames	2 frames	33 ms	40 ms
URS, External	3G Level A	ALL	3 ms	3 ms + 1 frame	17 ms	20 ms
	3G Level B DL	3G Level A	3 ms	3 ms + 1 frame	17 ms	20 ms
		3G Level B DL	3 ms	3 ms + 2 frames	33 ms	40 ms

Quad Link 3G – 2SI/Square

Ref	SDI Input	SDI Output	Processing Delay			
			Async or Isochrone Inputs		Synced & Phase-Aligned Inputs	
			Min.	Max.	59Hz	50Hz
Input	ALL	ALL	2 frames	2 frames	33 ms	40 ms
URS, External	2SI Quad Link 3G Level A	2SI Quad Link 3G Level A	3 ms	3 ms +1 frame	17 ms	20 ms
		2SI Quad Link 3G Level B DL	3 ms	3 ms +1 frame	17 ms	20 ms
	2SI Quad Link 3G Level B	2SI Quad Link 3G Level A	3 ms	3 ms +1 frame	17 ms	20 ms
		2SI Quad Link 3G Level B DL	3 ms	3 ms + 2 frames	33 ms	40 ms
	2SI Quad Link 3G Level A	SQ Quad Link 3G Level A	3 ms +1 frame	3 ms + 2 frames	33 ms	40 ms
		SQ Quad Link 3G Level B DL	3 ms +1 frame	3 ms + 2 frames	33 ms	40 ms
	2SI Quad Link 3G Level B	SQ Quad Link 3G Level A	3 ms +1 frame	3 ms + 2 frames	33 ms	40 ms
		SQ Quad Link 3G Level B DL	3 ms + 2 frames	3 ms + 4 frames	67 ms	80 ms
	SQ Quad Link 3G Level A	2SI Quad Link 3G Level A	3 ms +1 frame	3 ms + 2 frames	33 ms	40 ms
		2SI Quad Link 3G Level B DL	3 ms +1 frame	3 ms + 2 frames	33 ms	40 ms
	SQ Quad Link 3G Level B	2SI Quad Link 3G Level A	3 ms +1 frame	3 ms + 2 frames	33 ms	40 ms
		2SI Quad Link 3G Level B DL	3 ms + 2 frames	3 ms + 4 frames	67 ms	80 ms
	SQ Quad Link 3G Level A	SQ Quad Link 3G Level A	3 ms	3 ms + 1 frame	17 ms	20 ms
		SQ Quad Link 3G Level B DL	3 ms	3 ms + 1 frame	17 ms	20 ms
	SQ Quad Link 3G Level B	SQ Quad Link 3G Level A	3 ms	3 ms + 1 frame	17 ms	20 ms
		SQ Quad Link 3G Level B DL	3 ms	3 ms + 2 frames	33 ms	40 ms

Quad Link 3G to 12G

Ref	SDI Input	SDI Output	Processing Delay			
			Async or Isochrone Inputs		Synced & Phase-Aligned Inputs	
			Min.	Max.	59Hz	50Hz
Input	ALL	12G	2 frames	2 frames	33 ms	40 ms
URS, External	2SI Quad Link 3G Level A	12G	3 ms	3 ms + 1 frame	17 ms	20 ms
	2SI Quad Link 3G Level B DL	12G	3 ms	3 ms + 1 frame	17 ms	20 ms
	SQ Quad Link 3G Level A	12G	3 ms + 1 frame	3 ms + 2 frames	33 ms	40 ms
	SQ Quad Link 3G Level B DL	12G	3 ms + 1 frame	3 ms + 2 frames	33 ms	40 ms

12G to Quad Link 3G

Ref	SDI Input	SDI Output	Processing Delay			
			Async or Isochrone Inputs		Synced & Phase-Aligned Inputs	
			Min.	Max.	59Hz	50Hz
Input	12G	ALL	2 frames	2 frames	33 ms	40 ms
URS, External	12G	2SI Quad Link 3G Level A	3 ms	3 ms + 1 frame	17 ms	20 ms
	12G	2SI Quad Link 3G Level B DL	3 ms	3 ms + 1 frame	17 ms	20 ms
	12G	SQ Quad Link 3G Level A	3 ms + 1 frame	3 ms + 2 frames	33 ms	40 ms
	12G	SQ Quad Link 3G Level B DL	3 ms + 1 frame	3 ms + 2 frames	33 ms	40 ms

The XIP-3901 has an integrated frame sync that supports synchronous and asynchronous SDI input signals. The input signals will be synchronized and realigned to either the URS or External Reference.

The frame sync behaves like a frame buffer. It also supports frame skips/repeats in the case of an asynchronous SDI input. When an input error occurs, it freezes to the last valid field/frame.

Min. Delay	Ref	Signal	SDI Input	SDI Output	Skip/Repeat Period	Freeze on Input Error
OFF	Input	ALL	ALL	ALL	N/A	None
	URS, External	Video	HD/1080i	HD/1080i	2 fields	Last valid field
			HD/720p	HD/720p	1 frame	Last valid frame
			3G Level A	ALL	1 frame	Last valid frame
			12G	ALL	1 frame	Last valid frame
			3G Level B DL	3G Level A	1 frame	Last valid frame
				3G Level B DL	2 frames	Last valid frame
			Quad Link 3G Level A	ALL	1 frame	Last valid frame
			Quad Link 3G Level B DL	Quad Link 3G Level A	1 frame	Last valid frame
	Quad Link 3G Level B DL	2 frames		Last valid frame		
	Audio	PCM	N/A	Tracking during 15 seconds per frame	Muted	
		Non-PCM	N/A	Instant catch-up	Muted	
Metadata	ALL	N/A	Lost when skipped, duplicated when repeated	Blanked		
ON	ALL	ALL	ALL	ALL	N/A	None

For the 12G/3G/HD and Quad Link 3G operating modes, Minimum Delay can be enabled on a channel. The reference source will be internally forced to Input for the channel, and the user settings for the reference source will be ignored (see [10.6 Reference Panel](#) for more information). The Frame Sync and Deglitcher will be bypassed, and the Test Tone Generator will no longer be available. The following warning message will appear to request confirmation to enable Minimum Delay:

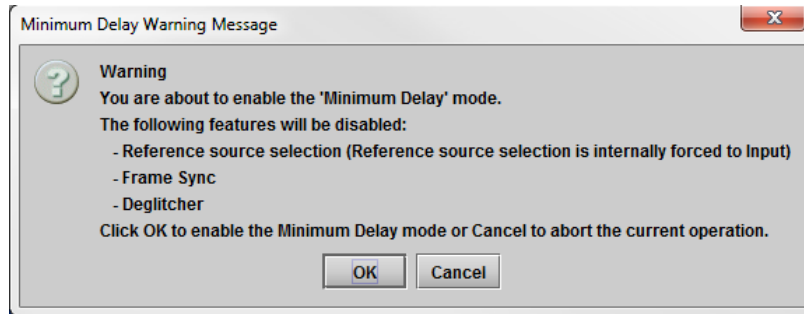


Figure 31– Disabled Features

10.3.3 Deglitcher Tab

For each synchronizer, select the appropriate deglitcher mode (ON or OFF) using the pulldown menu.

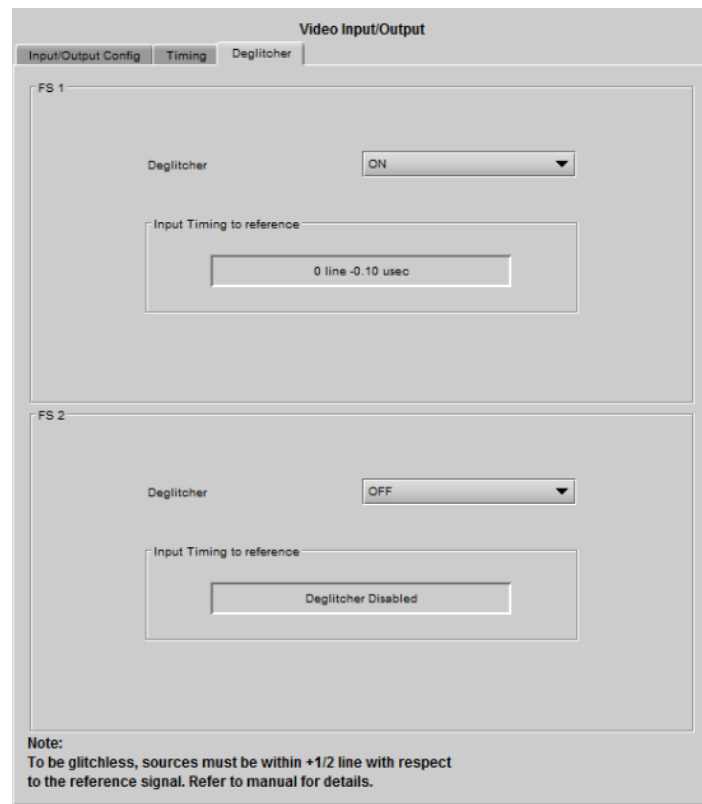


Figure 32– Deglitcher Tab

When the deglitcher is enabled, the card supports a hot switch between two signals (either on the same input, or between the card’s two inputs) without producing a freeze on the frame sync, and without producing artifacts on the output.

The deglitcher must be disabled when the input is asynchronous to the reference. Otherwise, it will create audio and video glitches at the output.

For this mode to function correctly, the following requirements must be met:

- The two inputs must be synchronized to the reference
- They must be phased within one line of each other
- They must be phased to within +/- ½ line of the HREF of the reference signal

The offset from the VREF can be variable, but a distance of greater than 10 lines could create an artifact in the active video. If the two signals are more than one line apart, a vertical jump will occur at the moment of switching that is proportional to the number of vertical lines of offset between the two signals. This will last for only one frame. For more information about using clean switch regions to perform glitch-free switches, see [10.4 Clean Switch Regions and Examples](#).

The Input Timing to Reference box reports any difference in timing between the input and reference when the transition occurs. When the deglitcher is disabled, it will display “Deglitcher Disabled”. When the deglitcher is enabled, it can display one of the following error messages in red:

- Missing Reference: The External or URS reference source is missing.
- Locked on Input: The reference source is set to Input.
- Video Error: There is an error with the input.

10.4 Clean Switch Regions and Examples

To perform a glitch-free switch between two sources, they must be in the same clean switch region. A clean switch region is contained within $\pm \frac{1}{2}$ line about an H=0 point in the reference signal, as shown by the dotted lines in the figure. There is a clean switch region centered on every H interval. As you can see, vertical alignment with the reference is not important for the deglitcher to operate properly.

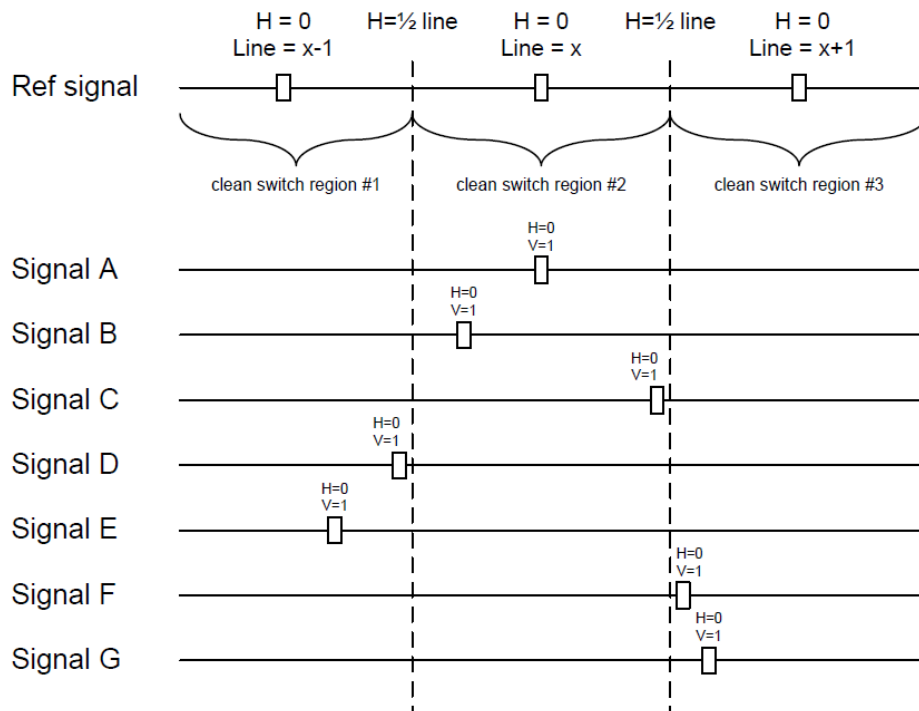


Figure 33– Clean Switch Regions

You may switch between signals A, B or C, without any glitches, and also between the D->E and F->G signals. Any other transition, like A->D, will cause a vertical image shift for one frame.

To determine whether a clean hot switch is possible, you need to determine whether the two sources lie in the same clean switch region. You can measure the position of the signals with respect to the reference:

- Use the deglitcher tab in iControl (Video Input/Output -> Deglitcher)

When the deglitcher is enabled, the alignment offset between the reference signal and the input signal can be displayed for either of these sources. Knowing the offset for both input signals, you can determine if they are in the same clean switch region. If so, any hot switch between those two signals will be glitch-free.

To determine the limits of a clean switch region, you must know the input's line length in μs . The first region is delimited by $+\frac{1}{2}$ line and $-\frac{1}{2}$ line of the reference. For example, with an HD (1080i59) signal, the line length is $29.65 \mu\text{s}$ and so the first region lies between $-14.83 \mu\text{s}$ and $14.83 \mu\text{s}$. Other regions can be found by adding or removing a multiple of line length to the two boundaries.

Example: For an HD (1080i59) input signal, we have these clean switch regions:

- -1 line and $-14.83 \mu\text{s}$ to 0 line and $-14.83 \mu\text{s}$;
- 0 line and $-14.83 \mu\text{s}$ to 0 line and $14.83 \mu\text{s}$;
- 0 line and $14.83 \mu\text{s}$ to 1 line and $14.83 \mu\text{s}$; etc.

Practical examples:

Example 1: We have two HD (1080i59) sources, one that indicates an offset of $-10 \mu\text{s}$ with respect to the reference (A) and the other an offset of $-20 \mu\text{s}$ (B). We know that a clean switch region limit is present at $-\frac{1}{2}$ line, which corresponds to $-14.83 \mu\text{s}$. We can now determine that this switch will not be clean, because the two sources are on opposite sides of the limit and are therefore not in the same clean switch region.

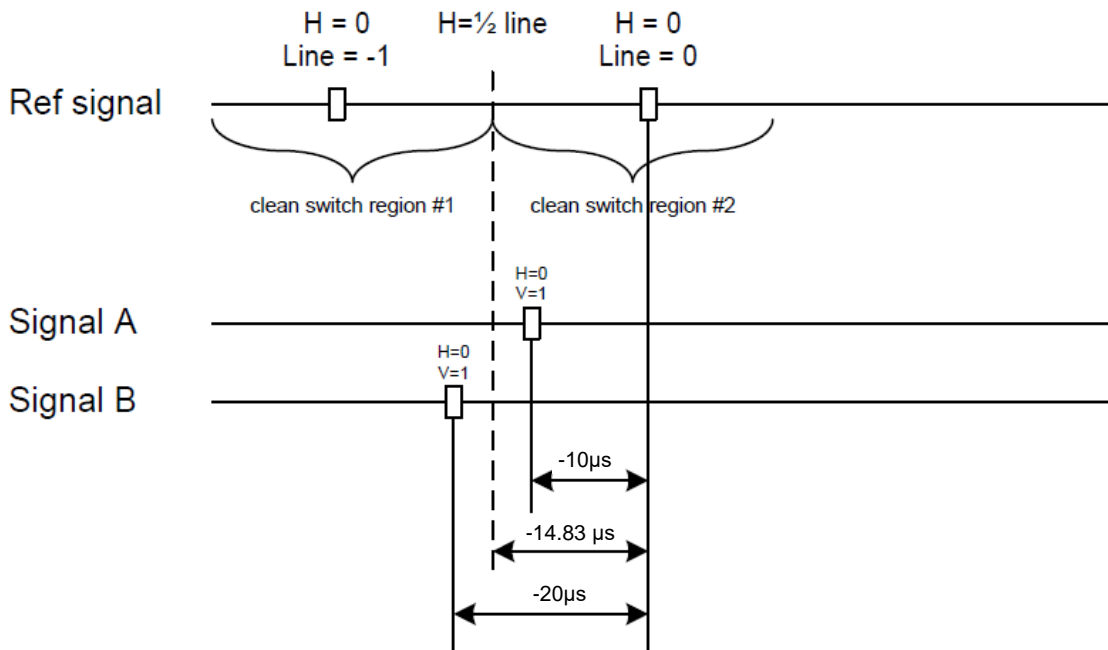


Figure 34– Clean Switch Regions Example 1

Example 2: We have two HD (1080i59) sources, one that indicates an offset of $30 \mu\text{s}$ with respect to the reference (A) and the other an offset of $20 \mu\text{s}$ (B). We know that a clean switch region limit is present at $+\frac{1}{2}$ line

and another one at $\frac{1}{2}$ line plus one line. These correspond to $14.83 \mu\text{s}$ and $44.48 \mu\text{s}$. We can now determine that this switch will be clean, because the two sources are inside the same clean switch region.

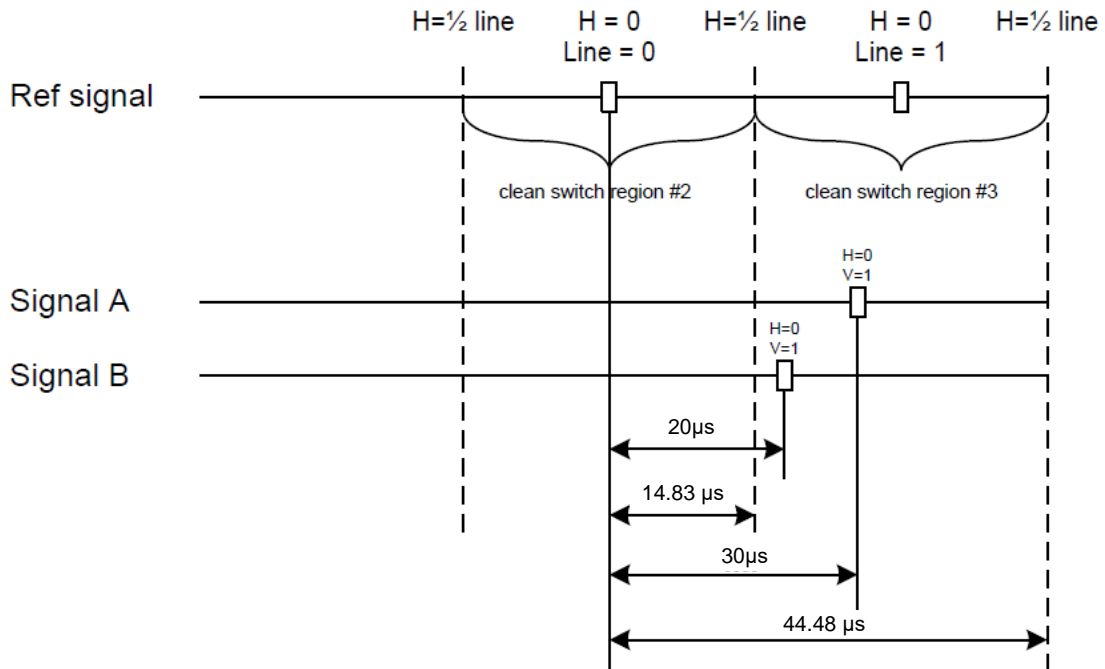


Figure 35– Clean Switch Regions Example 2

10.5 HDR Panel

The HDR panel has two tabs (**UC1** and **UC2 / DC1** and **DC2 / FS1** and **FS2**); one for each of XIP-3901-UC / -DC / -FS's independent processing channels. The configuration of the **UC2 / DC2 / FS2** tab is the same as the **UC1 / DC1 / FS1** tab. Only the configuration of the **UC1** tab is shown below as a representative example for all XIP-3901-UC / -DC / -FS applications.

10.5.1 UC1&2 / DC1&2 / FS1&2 Tabs

Grass Valley offers its own HDR processing. However, you can decide to use BBC LUTs or to load your own Custom LUTs. Furthermore, we can correct incoming VPID without applying any HDR conversion. Use the radio button to select the desired processing. Grass Valley HDR processing is selected by default.

Grass Valley BT.709 to BT2020 and BT.2020 to BT.709 are always available. Other video processing settings can be enabled for each channel by activating the **XIP-3901-UDC-HDR** option. See [10.9 Options Panel](#) for details about how to activate card options.



Figure 36–HDRUC1 / UC2 Tab (Shown on XIP-3901-UC)

Property	Description
Enable	Set to enable color space conversion and dynamic range conversion. When disabled, incoming color space and dynamic range are bypassed without processing. The Applied Conversion statuses will indicate “Bypass”. The user can change the HDR processing setting values even if processing is disabled, but processing will not be performed. Processing is disabled by default.
Grass Valley LUTs	Set the LUT to use for HDR processing. The following HDR processing setting are available as part of the Grass Valley LUTs : <ul style="list-style-type: none"> • BT.709 to BT.2020 • BT.2020 to BT.709 • SDR to HLG BT.2100 • SDR to PQ BT.2100 • HLG BT.2100 to SDR • PQ BT.2100 to SDR • PQ BT.2100 to HLG BT.2100 • HLG BT.2100 to PQ BT.2100 • S-Log3 S-Gamut3 to BT.709 800% • S-Log3 S-Gamut3 to HLG BT.2100 • S-Log3 S-Gamut3 to PQ BT.2100
BBC LUTs	Set the LUT to use for HDR processing. The following HDR processing setting are available as part of the BBC LUTs : <ul style="list-style-type: none"> • BBC PQ 1000 FR to HLG v1.3.1 • BBC PQ 1000 to HLG v1.3.1 • BBC PQ 4000 FR to HLG v1.3.1 • BBC PQ 4000 to HLG v1.3.1 • BBC SDR DR to HLG v1.3.1 • BBC SDR SR to HLG v1.3.1 • BBC SDR SR strict to HLG v1.3.1 • BBC SDR DR UC to HLG v1.3.1 • BBC SDR SR UC to HLG v1.3.1 • BBC SDR SR UC strict to HLG v1.3.1 • BBC HLG to PQ 1000 V1.3.2 • BBC HLG to SDR DR v1.3.1 • BBC SLog3 100% to HLG v1.3.1 • BBC SLog3 200% to HLG v1.3.1 • BBC HLG to SDR SR v1.3.1 • BBC HLG to SDR SR Strict v1.3.1 • Unity
Custom LUTs	Set the LUT to use for HDR processing. You can pre-load up to 8 custom HDR conversions on the card. These are configured in the Custom LUTs tab.
No Conversion, but force output VPID	Set to force the use of a VPID. Sometimes, incoming HDR processing is not flagged properly on VPID. You can use this option to correct outgoing VPID: <ul style="list-style-type: none"> • SDR BT.709 Narrow • HLG BT.2020 Narrow • PQ BT.2020 Narrow • PQ BT.2020 Full
HLG BT.2100 to SDR – Input HDR Ref White (nits)	Set the <i>reference white</i> luminance level in nits that will become 100% white in the SDR output. The value range must be between 100 and 1000 nits. The default value is 203 nits. This parameter is only applied when the Grass Valley HLG BT.2100 to SDR LUT is selected.

Property	Description
SDR to HLG BT.2100 – Output HDR Ref White (nits)	Set the <i>reference white</i> luminance level in nits for the HDR output that represents 100% white in the SDR input. The value range must be between 100 and 1000 nits. The default value is 203 nits. This parameter is only applied when the Grass Valley SDR to HLG BT.2100 LUT is selected.
PQ BT.2100 to SDR – Input HDR Ref White (nits)	Set the <i>reference white</i> luminance level in nits that will become 100% white in the SDR output. The value range must be between 100 and 1000 nits. The default value is 203 nits. This parameter is only applied when the Grass Valley PQ BT.2100 to SDR is selected.
PQ BT.2100 to SDR – Input Range	Set the input range to Full or Narrow : <ul style="list-style-type: none"> • Full: 0 to 1023 image mapping range according to SMPTE RP. 2077. • Narrow: The standard 64 to 940 image mapping broadcast range. This parameter is only applied when the Grass Valley PQ BT.2100 to SDR LUT is selected.
SDR to PQ BT.2100 – Output HDR Ref White (nits)	Set the <i>reference white</i> luminance level in nits for the HDR output that represents 100% white in the SDR input. The value range must be between 100 and 1000 nits. The default value is 203 nits. This parameter is only applied when the Grass Valley SDR to PQ BT.2100 LUT is selected.
SDR to PQ BT.2100 – Output Range	Set the output range to Full or Narrow : <ul style="list-style-type: none"> • Full: 0 to 1023 image mapping range according to SMPTE RP. 2077. • Narrow: The standard 64 to 940 image mapping broadcast range. This parameter is only applied when the Grass Valley SDR to PQ BT.2100 LUT is selected.
Colorimetry	Shows the applied conversion according to the above settings.
Transfer Characteristic	
Range	

10.5.2 Custom LUTs Tab

This tab allows you to load up to 8 custom LUTs (LUT1 to LUT8) that can be selected for use in the **UDC1/2** tabs. The XIP only supports files that conform to the Adobe Cube file v1.0 format. Custom LUTs are shared among all XIP applications. This feature requires the **XIP-3901-UDC-HDR** option. See 10.9 Options Panel on page 65 for details about how to activate card options.

In order to use Custom LUTs, you first need to configure the Network tab. See 10.8 Network Panel on page 63.

You can Load up to 8 LUTs. For each custom LUT you load, you need to specify input/output colorimetry, input/output range and output transfer characteristics.

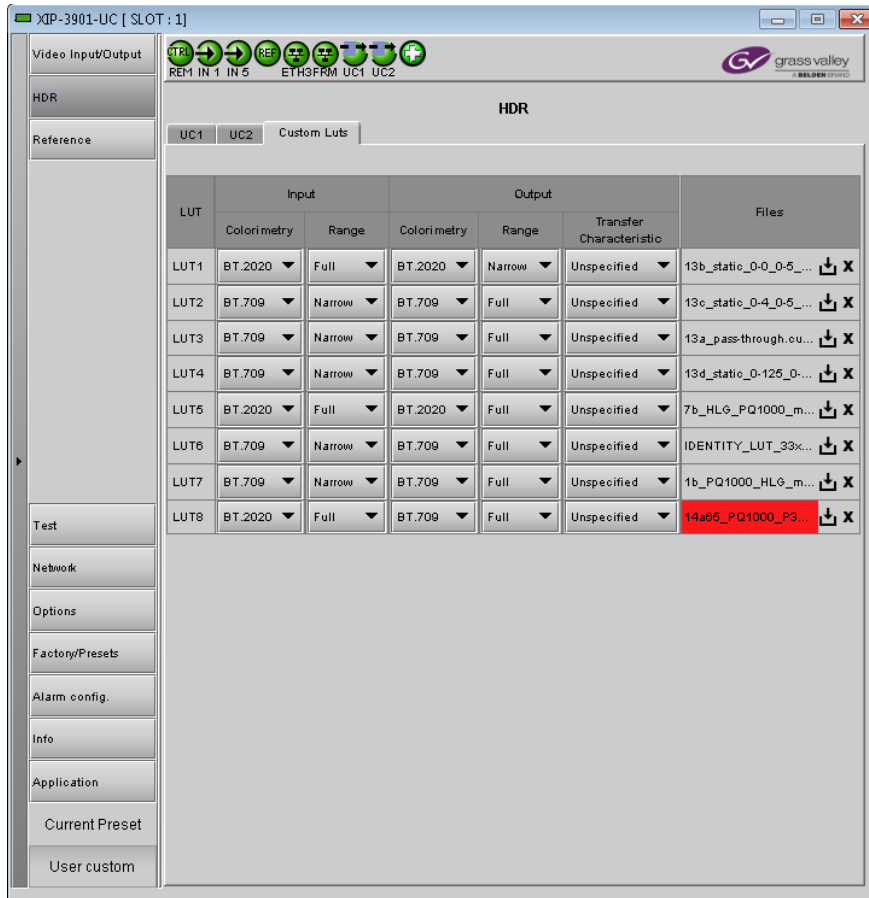


Figure 37–Custom LUTs Tab

Property	Custom LUTs Parameters	Available Values / Description
Input	Colorimetry	BT.709, BT.2020
	Input Range	Narrow, Full
Output	Colorimetry	BT.709, BT.2020
	Output Range	Narrow, Full
	Transfer Characteristic	SDR, HLG, PQ, Unspecified
Files	–	Click to download or replace a LUT file. Click to remove the currently loaded LUT file. The name of the currently loaded LUT file will be partially displayed. Mouse-over the field to display the full name. The background will change to RED if the uploaded file is invalid.

10.6 Reference Panel

This panel is used to select the reference to be used by the XIP-3901 for synchronization.



Figure 38– Reference Panel (Shown on XIP-3901-UC)

Property	Description
Reference Presence	The icons show the presence and status of the various reference sources. For the external reference, the format is shown in the External Format window. Gray: There is no carrier or the carrier is not valid. Yellow: The carrier is present and is valid but its format is not supported. Green: The carrier is present and is valid and its format is supported.
External Format	Shows the current external reference format. The following shows which reference formats are supported: NTSC: Supported PAL: Supported 1080i 59 Hz: Unsupported 1080i 50 Hz: Unsupported 720p 59 Hz: Unsupported 720p 50 Hz: Unsupported

Property	Description
Selected Reference	<p>Shows which source is selected as a reference for each channel. The icons show whether the channel is locked to its reference or not.</p> <p>Gray: Locked on input, but the reference is not available.</p> <p>Green: Locked.</p> <p>Red: Missing, invalid, unsupported, or the channel is not locked to the selected reference.</p> <p>Note: If the selected reference is missing, invalid or unsupported, the SDI output(s) will be inactive (no carrier).</p>
Reference Source	<p>Use the radio buttons to select from the following settings:</p> <p>Auto (default): This mode selects the first source detected in this order of priority:</p> <ol style="list-style-type: none"> 1. External Reference input 2. URS 3. Input <p>External: Selects the signal connected to the rear panel REF IN connector.</p> <p>URS: Selects the Universal Reference Signal from the Densité frame's backplane.</p> <p>Input: Each path will lock on its SDI input:</p> <ul style="list-style-type: none"> • UC1/DC1/FS1 on SDI IN 1 • UC2/DC2/FS2 on SDI IN 2 <p>Note: On the XIP-3901-UC, you can enable 3G Output Minimum Delay for a 3G SDI Output in the Timing tab for a channel. On the XIP-3901-FS, you can enable Minimum Delay for a channel with the 12G/3G/HD and Quad Link 3G operation modes. In these cases, the reference source will be forced to Input for the channel (for the XIP-3901-UC, this will only occur if SDI input is 3G). For more information, see 10.1.2 Timing Tab.</p>
URS Format	<p>Use the radio buttons in the URS Format area to select the URS mode:</p> <p>OFF (default): URS cannot be selected as the reference source and is ignored by the Auto detection mode. URS is grayed out in the Reference Source section of the user interface.</p> <p>URS 29.97 Hz: If Reference Source is set to URS, lock on 29.97 Hz.</p> <p>URS 25 Hz: If Reference Source is set to URS, lock on 25 Hz.</p>

10.7 Test Panel

You may activate the Color Bars & Tone test signal for the two channels independently by enabling the appropriate checkboxes.





Figure 39– Test Panel (Shown on XIP-3901-UC)

Property	Description
Color Bars & Tone	<p>Enables test signals at the card’s output:</p> <ul style="list-style-type: none"> Video: Generate a video test pattern. On HD Video outputs, this will generate a 75% color bar with 75% white. On 3G, Quad Link 3G and 12G Video outputs, test pattern will follow the format setting. In the XIP-3901 UC only, the 75% color bar is inserted as 3G/HD SDI and upconverted to 12G/3G/Quad Link 3G. Audio: Generate a 1 KHz sine wave at -18dBFS on all audio channel outputs: <ul style="list-style-type: none"> Continuous tone on right channel; pulsed tone on left channel of every pair (250 ms pulse every 3 seconds). Audio inserted on Quad Link 3G - link 1 only. Metadata: blank except for VPID on SDI output
Format	<p>Set video test pattern format for 3G, Quad Link 3G and 12G Video outputs:</p> <ul style="list-style-type: none"> SDR BT.709 (75%): 75% Color bar with 75% white HLG BT.2110-0: Test pattern HLG narrow range as per ITU-R BT.2111-0 PQ Narrow BT.2111-0: Test pattern PQ narrow range as per ITU-R BT.2111-0 PQ Full BT 2111-0: Test pattern PQ full range as per ITU-R BT.2110-0

Status

When Test mode is activated on a channel, the status icon display for that channel will show the Color Bars&Tone icon.

Test Pattern	Operating Mode	Icon
Enabled	Color Bars&Tone	
Disabled	Process	

10.8 Network Panel

The Network panel is used to set the network configuration of the ETH3 Ethernet port on the XIP-3901 and the bridged port through the Densité frame controller (FRM). These settings are shared by all UC, DC, and FS applications, since there is only one Ethernet port on the platform.

The ETH3 Ethernet port is used to perform firmware upgrades and to download HDR Custom LUTs on the XIP-3901 only if the card is installed in a Densité 3+FR1 or Densité 3+FR4 frame with a CPU-ETH3 Basic controller. When the card is installed in a Densité 3+FR4 frame with a CPU-ETH3 Standard or Advanced controller, the firmware upgrade is performed using the frame controller’s Ethernet port and HDR Custom LUTs can be downloaded through the bridged port through the Densité frame controller (FRM).

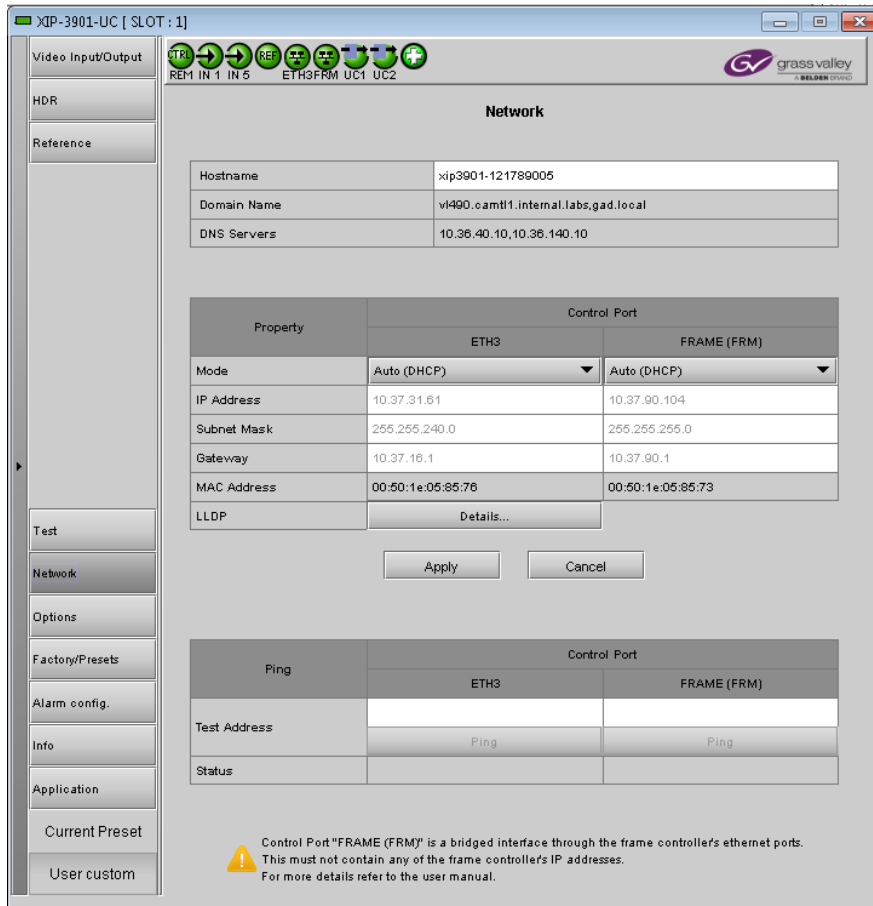


Figure 40– Network Panel (Shown on XIP-3901-UC)

Property	Description
Hostname	Set a unique network identification label by which this device will be known. Only alpha-numeric characters and the hyphen are permitted.
Domain Name	Shows the name of the domain(s) the card is part of. At least one interface must be configured with DHCP in order to be able to receive this information.
DNS Servers	Shows the addresses of the name resolution servers. At least one interface must be configured with DHCP in order to be able to receive this information.

Property	Description
Control Port ETH3, Control Port Frame (FRM)	The FRM port is a bridged port through the Densité frame controller. The physical frame controller's Ethernet port must be connected to the network for this interface to work. Note: The FRM port address must not contain any of the frame controller's IP addresses. Control ports can be used for firmware upgrades: <ul style="list-style-type: none"> If the card is installed in a Densité 3+FR1 or Densité 3+FR4 frame with a CPU-ETH3 Basic controller, the ETH3 port must be used. Note: Before upgrading through the ETH3 port, you will need to configure ETH3 through local menu or install the iControl bundle for the current firmware version in order to configure ETH3. Once ETH3 has been configured, you will be able to upgrade/downgrade the card and its iControl bundle. If the card is installed in a Densité 3+FR4 frame with a CPU-ETH3 Standard or Advanced controller, the firmware upgrade is performed using the frame controller's Ethernet port (FRM).
Mode	Set the mode to assign an IP address to an Ethernet port. Off: Ethernet port disabled, it will not be used. Auto (DHCP): Ethernet port enabled with automatic configuration using a network's DHCP server. Static: Ethernet port enabled with static user specified configuration (IP Address, Subnet Mask, and Gateway).
IP Address	When Mode is set to Static , set the card's IP address.
Subnet Mask	When Mode is set to Static , set the subnet mask for your network.
Gateway	When Mode is set to Static , set the network switch's IP address.
MAC address	Shows the Ethernet port's MAC Address.
LLDP	Shows the Link Layer Discovery Protocol (LLDP) TLV values. LLDP is used to advertise the identity, capabilities, and neighbors on a LAN. Click Details for any one Ethernet port to view the LLDP TLV values. See Figure 41.
Test Address	Test the IP connectivity to a device (on the same network) from any one Ethernet port for troubleshooting purposes. Enter the device's IP address and click Ping . In Status , a message shows the ping's IP connectivity status.
Apply Cancel	When active, this applies or rejects your current changes. Pending changes are displayed in red.

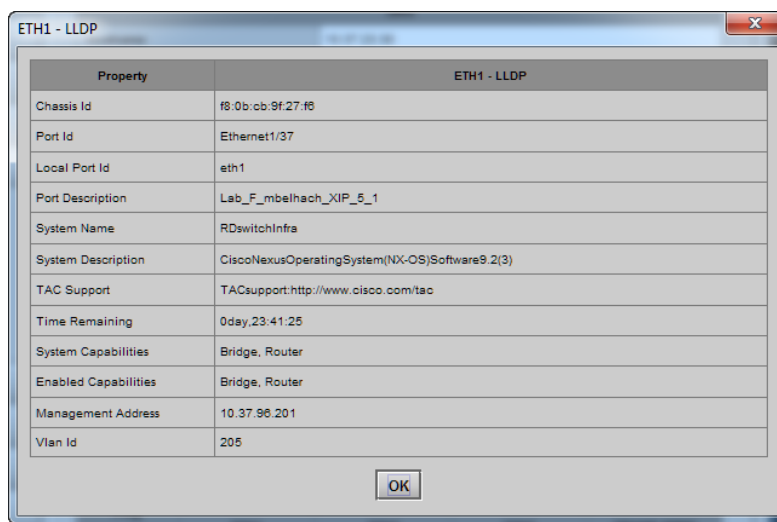


Figure 41– Network ETH LLDP Properties

10.9 Options Panel

There is one option available for the XIP-3901:

- XIP-3901-UDC-HDR:** Enables the card's HDR conversion function. This option is shared by all applications; for example, when activated on a XIP-3901-UC application, it will also be activated on any XIP-3901-DC and XIP-3901-FS applications. When this option is activated, all HDR conversion settings are available. When it is not activated, only the BT.709 to BT.2020 and BT.2020 to BT.709 settings are available. See [10.5 HDR Panel](#) to see all settings available with this option.

To activate this option, you must:

- Obtain a license key for the option from Grass Valley.
- Open the Options panel and select the appropriate tab.
- Type the license key in the Enter key box.
- Click **Enable option** to enable the option's features.

Once the option is activated, the status box beneath the Enter key area will show the status as active, with a green background.

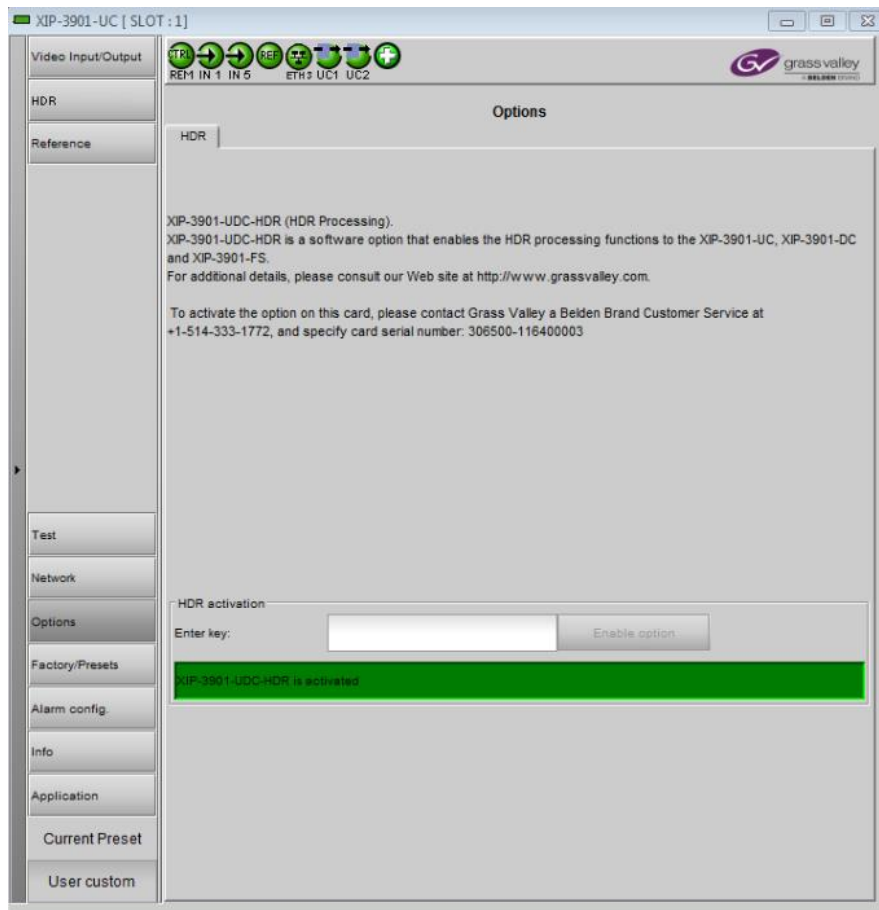


Figure 42– Options Panel (Shown on XIP-3901-UC)

10.10 Factory/Presets Panel

This panel provides access to three functions, which apply only to the current application (unlike the restore point, which saves the settings for all applications on the platform).

- User Presets
- Factory
- Profiles

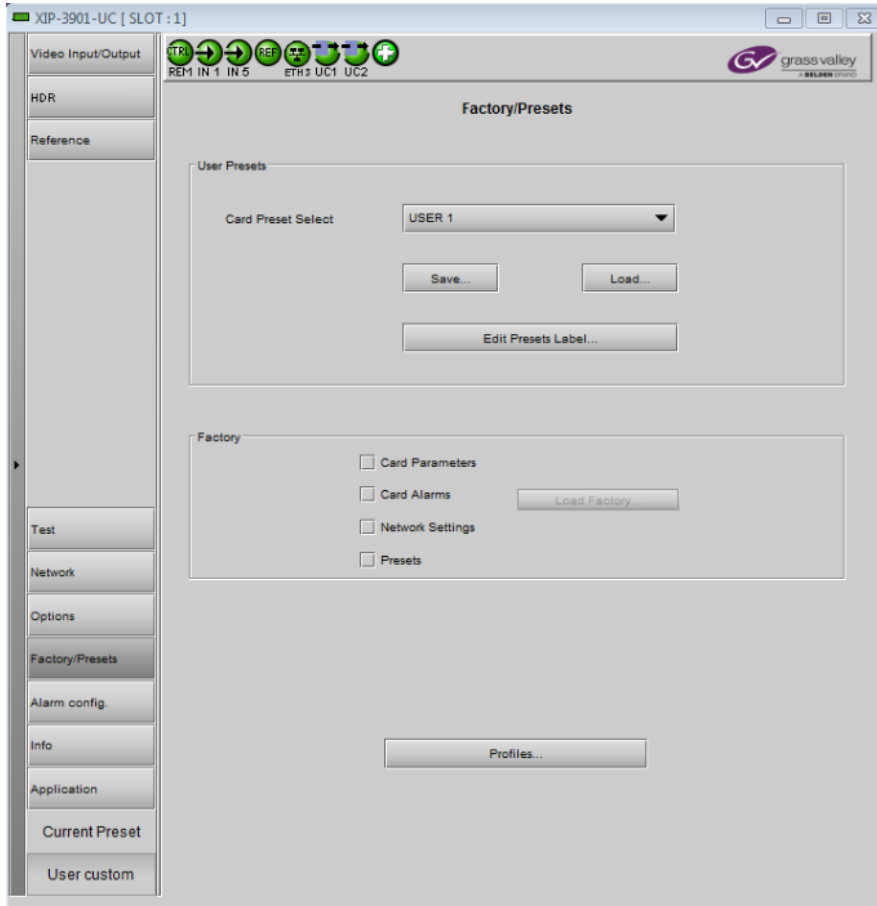


Figure 43– Factory/Presets Panel (Shown on XIP-3901-UC)

At the bottom left of the window, the Current Preset field displays the presets that are currently used on the XIP-3901 application. Possible values are:

- Factory default
- User defined presets (e.g. USER 1)
- User custom (when a setting has been modified from a defined preset or factory default settings)

10.10.1 User Presets

Each XIP-3901 application has memory registers that can hold up to five user-defined parameter settings.

Select any one of the five presets using the Card Preset Select pulldown menu.

Click **Load** to load the contents of the selected user preset into the XIP-3901 application. All parameter settings and values will be replaced by the contents of the selected user preset.

A confirmation box will pop up to allow you to proceed or cancel the load.

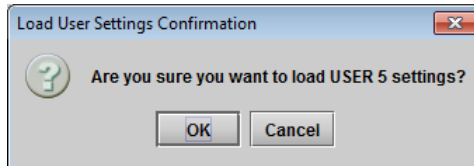


Figure 44–Load User Settings Confirmation Box

Click **Save** to store the current parameter settings and values from the XIP-3901 application in the selected user preset. The existing contents of the preset will be overwritten. A confirmation box will pop up to allow you to proceed or cancel the save.

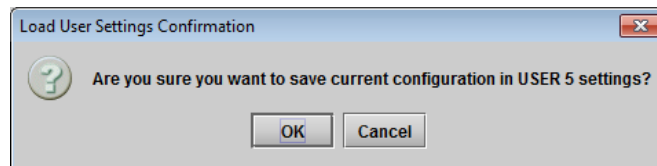


Figure 45–Save Configuration Confirmation Box

You can edit the name assigned to each user preset.

- Click **Edit Presets Label** to open the Presets window.
- Double-click on a name in the Label column.
- Type a new name in the window.
- Click **OK**.

The text you have entered (up to 16 characters) will be appended to the label name in the pulldown menu.

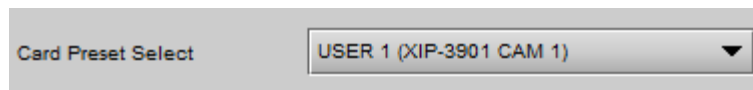


Figure 46– Card Preset Select

10.10.2 Load Factory button

Clicking the Load Factory button will restore the card to a factory default state. Four checkboxes can be used to choose whether to include card parameters, card alarms, network settings and presets in the restoration process.

Note: Card alarms are reset to factory values; iControl alarms and GSM alarms are not reset. With reference to the Alarm Configuration panel:

Reset by Load Factory? Yes No No

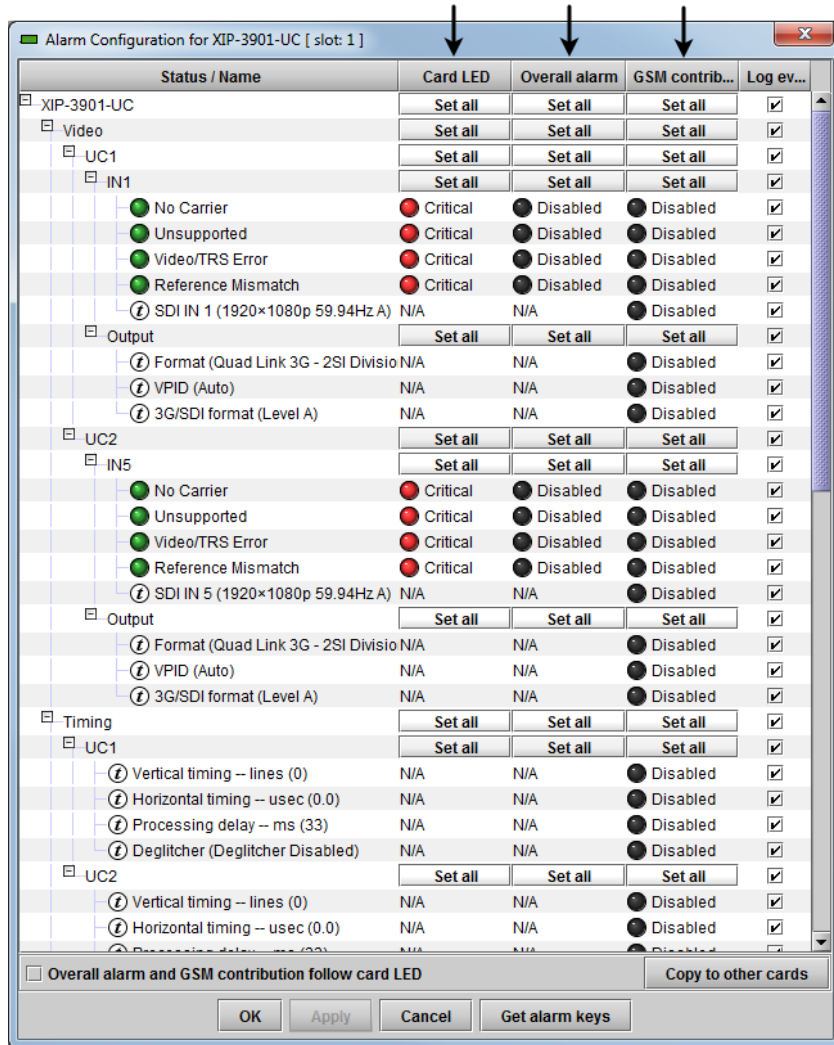


Figure 47–Alarm Types Reset by Load Factory (Shown on XIP-3901-UC)

10.10.3 Profiles

Use Profiles to save or recover the entire card configuration (including user presets if desired) on an external disk, or to copy it to another XIP-3901 card.

Click **Profiles** to open the Profile Copy window.

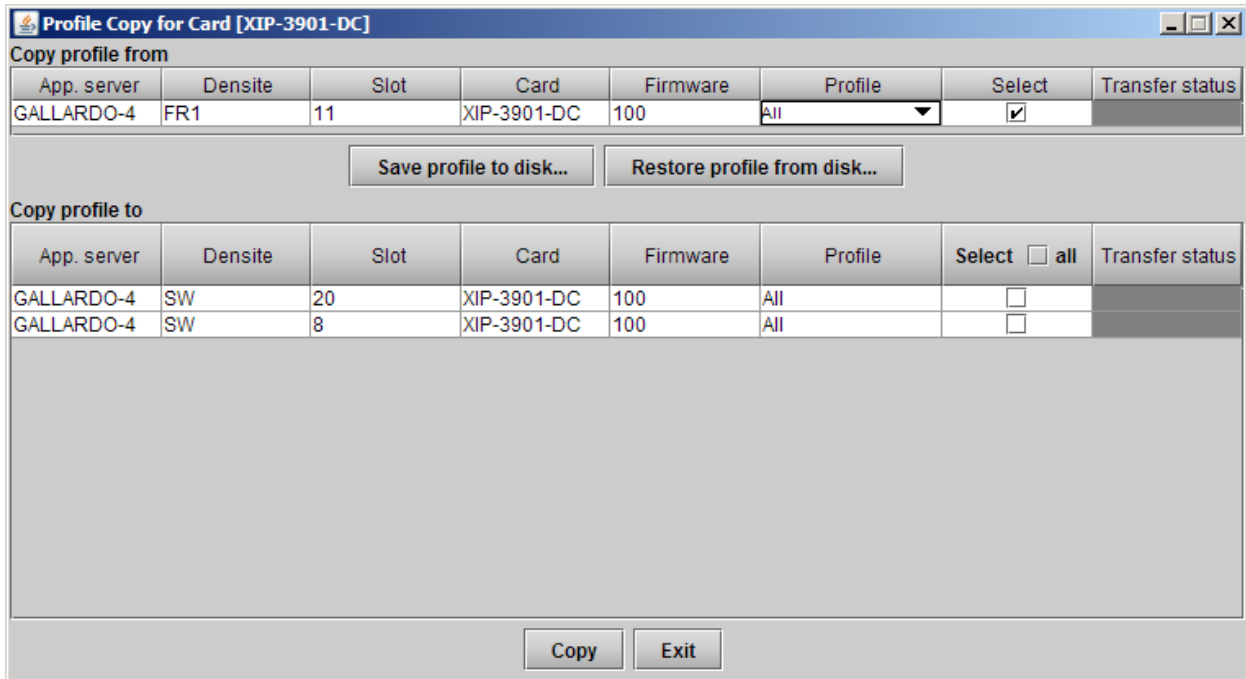


Figure 48–Profile Copy for Card (Shown on XIP-3901-DC)

Copy profile from

This line shows the XIP-3901 card and its App. server, Densité frame, slot number, card type, firmware version and profile.

The Profile column has a pulldown menu that allows you to select from the following profiles:

- All, Current, User1, User2, User3, User4, User5

Profile	Values
All (default)	The card’s current configuration and all presets will be copied or saved on disk
Current	Only the card’s current configuration will be copied or saved on disk
User1 ...User5	Only the selected preset will be copied or saved on disk

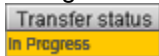
The Select column includes a checkbox (pre-checked) to confirm that you want to work with the current card.

Save profile to disk...

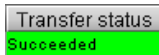
After selecting which profiles to save, click this button to open a Save dialog. Specify a file name and location to which the selected profiles for this card will be saved.

Note: It is a good idea to create a folder for these files, because they are not explicitly identified as XIP-3901 profiles and will be difficult to identify if not clearly named and conveniently located.

- Click **Save** once the name and location have been identified in the Save box. The Transfer Status box on the right of the Copy profile from line will indicate In Progress against a yellow background.



- If the file was saved correctly, the Transfer Status box will indicate Succeeded against a green background.



- If the file was not saved for some reason, the Transfer Status box will indicate Failed against a red background.

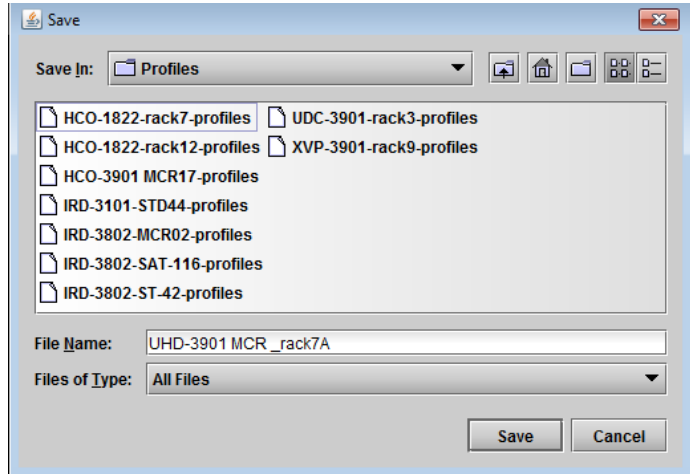


Figure 49–Save Profile to Disk Dialog

Restore profile from disk...

Click this button to open an Open dialog box to locate and select a valid XIP-3901 profile file.

- Click **Open** to read the contents of the file and reconfigure the XIP-3901's profiles accordingly.
- While the reconfiguration is in progress, the Transfer Status box on the right of the Copy profile from line will indicate Working against a yellow background.
- When the reconfiguration is complete, the Transfer Status box will indicate Succeeded against a green background.

On a restore profile from disk, there is no need to select a profile type (ALL, Current, User1 to User5). All the profile contents of the file will be restored.

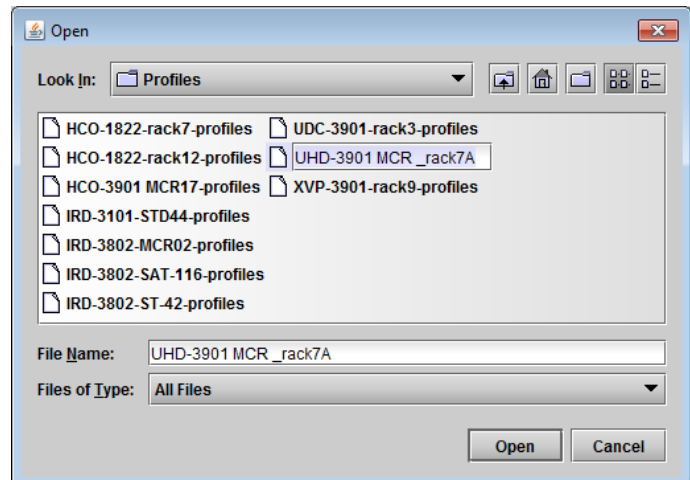


Figure 50–Restore Profiles from Disk Dialog

Copy profile to

This section shows other XIP-3901 cards that are available on the iControl network, each identified by its app. server, Densité frame, slot number, card type and firmware version.

The Profile column shows the same information as is shown for the current card in the Copy profile from line:

- All, Current, User1, User2, User3, User4, User5

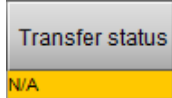
The Select column includes a checkbox to identify the XIP-3901 cards to which profiles will be copied from the current card.

- For convenience, a Select all checkbox is provided in the column header.

Click **Copy** to copy the selected profiles from this card into the selected other XIP-3901 cards.

- While the profile copy operation is in progress, the Transfer Status box on the right of the Copy profile to line will indicate Working against a yellow background.
- When the profile copy operation is complete, the Transfer Status box on the right of the Copy profile to line will indicate Succeeded against a green background.

Note: The source and destination cards must have the same firmware version. Any destination cards with a different firmware version that are shown in the Copy profile to list cannot be selected, and their transfer status is always N/A on a yellow background.



10.11 Alarm Config Panel

This panel is used to configure the alarm reporting of the XIP-3901 application. The panel opens in a new window when the button is clicked and can be resized.

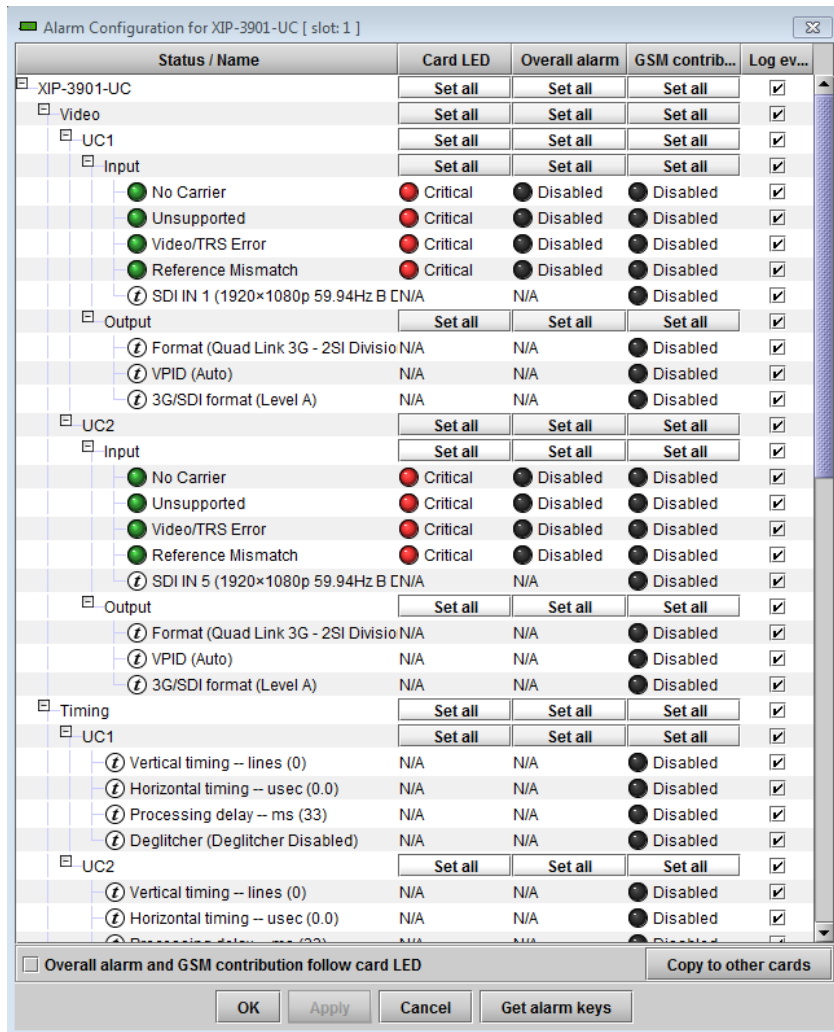


Figure 51—Alarm Configuration (Shown on XIP-3901-UC)

Status/Name

This column contains an expandable tree listing all the alarms reported by this XIP-3901card.

- Each alarm name includes an icon that shows its current status.
- Some alarms may be text-only, and the alarm status is shown in the name and not by a status icon.

Card LED, Overall Alarm and GSM Contribution

These columns contain pulldown menus used to set the severity level of each individual alarm to the alarm named in the column heading. This can be set independently for Card LED, Overall Alarm and GSM Contribution.



Card LED

This column is used to set the severity level of the selected individual alarm to the status LED located on the front card-edge. The Card LED status is shown at the bottom of the alarm tree in the Status/Name column. If at least one Critical or Major alarm is triggered, the LED will change to red. If no Critical or no Major alarms are triggered and Minor alarms are occurring, the LED will change to yellow.

Overall Alarm

This column is used to set the severity level of each individual alarm to the Overall Alarm associated with the card. The Overall Alarm is shown in the upper left corner of the iControl panel and also appears at the bottom of the Status/Name column.

GSM Contribution

This column is used to set the severity level of each individual alarm to the GSM Alarm Status associated with this card. GSM is a dynamic register of all iControl system alarms and is also an alarm provider for external applications. The possible values for this contribution are related to the Overall Alarm contribution:






- If the Overall Alarm contribution is Disabled, the GSM alarm contribution can be set to any available value.
- If the Overall Alarm contribution is any level other than Disabled, the GSM contribution is forced to follow the Overall Alarm.

Log Events

iControl maintains a log of alarm events associated with the card. The log is useful for troubleshooting and identifying event sequences. Check the box to log alarm events for each individual alarm.

Levels associated with these alarms:

The pulldown menus may contain some or all of the following settings:

	Disabled	The alarm makes no contribution (black icon)
	Minor	The alarm is of minor importance (yellow icon)
	Major	The alarm is of major importance (orange icon)
	Critical	The alarm is of critical importance (red icon)
	Passthrough	The alarm exists but has no effect (used for text and composite alarms)

Note: As a shortcut, you can click one of the Set All boxes beside a section heading to open a pulldown menu that lets you assign a level to all alarms in that section of the column simultaneously.

Once the alarms are configured, you may accept the changes or discard them:

Overall alarm and GSM contribution follow card LED

Check the box to force the Overall Alarm and GSM contribution to match the Card LED status.

- All Overall Alarms and GSM contributions for which there is a Card LED alarm will be forced to match the Card LED alarm.
- All Overall Alarms and GSM contributions for which there is no Card LED alarm will be forced to be Disabled.

A warning dialog box will open to ask you to confirm the action, since it will change the configuration and cannot be undone.

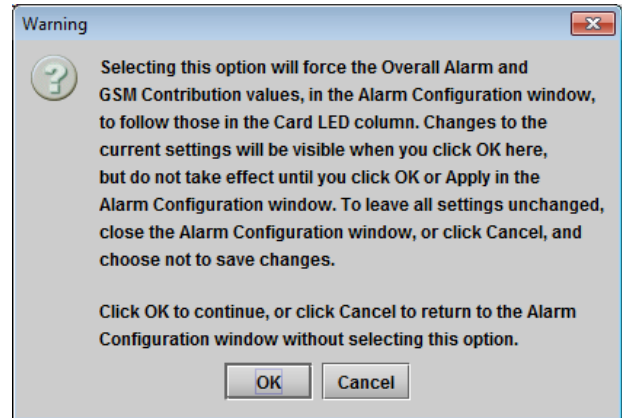


Figure 52–Warning for Follow LED Change

Copy to other cards

Click this button to open a panel that is used to copy the alarm configuration set for this card to another XIP-3901 card.

- Select one or more destination cards from the list in the window by checking the boxes, or check **All** to select them all.
- Note that when you copy a profile for the XIP-3901card (see [10.10.3 Profiles](#)), the alarm configuration is copied along with all the other settings.

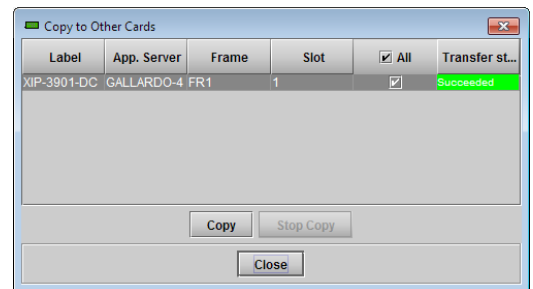


Figure 53–Copy to Other Cards Window

Get alarm keys

Click this button to open a save dialog where you can save a file containing a list of all alarms on this card and their current values, along with an alarm key for each. The alarm keys are useful for system integration and troubleshooting.

- The file is saved in .csv format.

OK, Apply, Cancel

- **OK:** Accepts the settings and closes the window once the card confirms that there are no errors.
- **Apply:** Accepts the settings but leaves the window open.
- **Cancel:** Closes the window without applying any changes and leaves the previous settings intact.

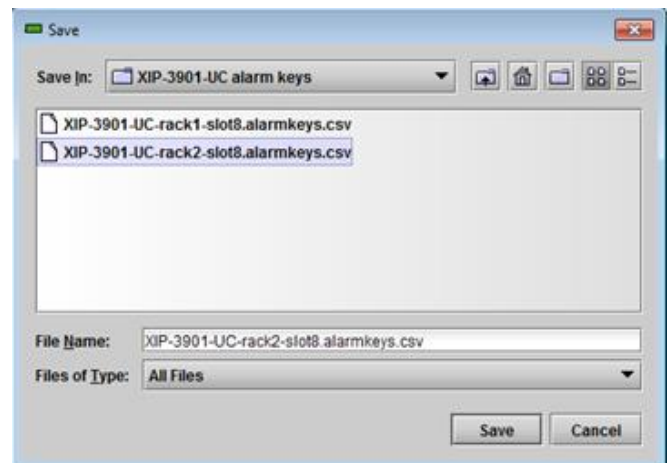


Figure 54–Get Alarm Keys Dialog

10.12 Info Panel

When the XIP-3901 is included in an iControl environment, certain information about the card should be available to the iControl system. The user can enter labels and comments that will make this card easy to identify in a complex setup. This information is entered into data boxes in the Info control panel.

- **Label:** Enter the label that appears for the XIP-3901 application in iControl applications.
- **Short label:** Enter the short-form label sometimes used by iControl (8 characters).
- **Source ID:** Enter a descriptive name for the XIP-3901 application.
- **Comments:** Enter any desired text.

The remaining data boxes show manufacturing information about the card.



Figure 55– Info Panel (Shown on XIP-3901-UC)

Three buttons in the panel give access to other information.

- **Details...:** Reports the service version and panel version for the card.

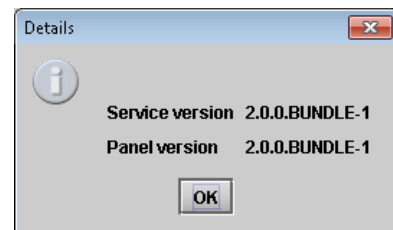


Figure 56–Details Window

- **Advanced...:** Shows the Long ID for this card. The Long ID is the address of this XIP-3901 application on the iControl network.

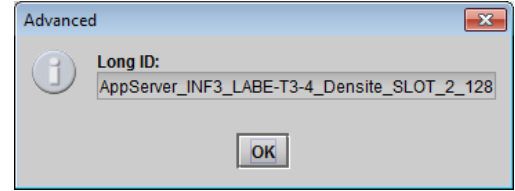


Figure 57–Advanced Window

- **Remote system administration...:** Opens the *Joining Locators* window, which lists the remote lookup services to which this XIP-3901 application is registered.

Add: Force the iControl service for this XIP-3901 application to register itself on a user-specified Jini lookup service, using the following syntax in the data box:

jini://<ip_address>

where <ip_address> is the IP address of the server running the lookup service:

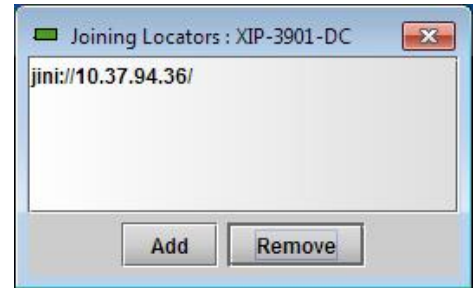


Figure 58–Joining Locators Window

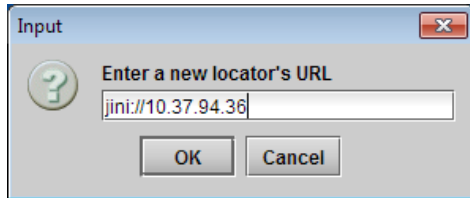


Figure 59– Add Window

Remove: Click to select one of the services listed in the window and click **Remove**. A confirmation dialog box will appear.

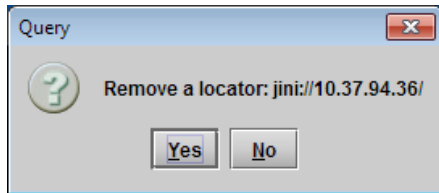
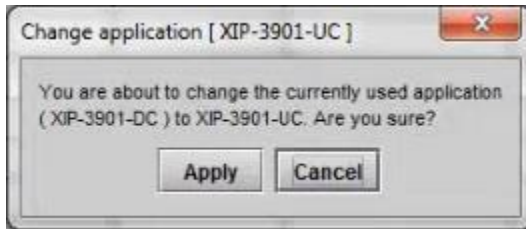


Figure 60– Remove Window

To switch to a different application:

1. Select the **In Use** radio button for the application you wish to use.
2. In the Change application dialog box, click **Apply**.
3. Wait several seconds for the application to reboot.



11 Fan Replacement

In the event of a fan failure, Grass Valley has replacement fans available that can be installed in the field. Contact Grass Valley Customer Support for details.



Figure 62–Fan Assembly on the XIP-3901 Card

11.1 Required Materials

To replace the fan assembly on the XIP-3901 card, you will need:

- XIP-3901-FAN Fan Assembly Replacement Kit
- Anti-static mat
- Needle-nose pliers
- Tweezers

11.2 Procedure

Step 1: Remove the failed fan assembly

1. Remove the XIP-3901 card from the Densité frame.
2. Flip the card over on an anti-static mat so that you can see the rear (solder side) of the card.

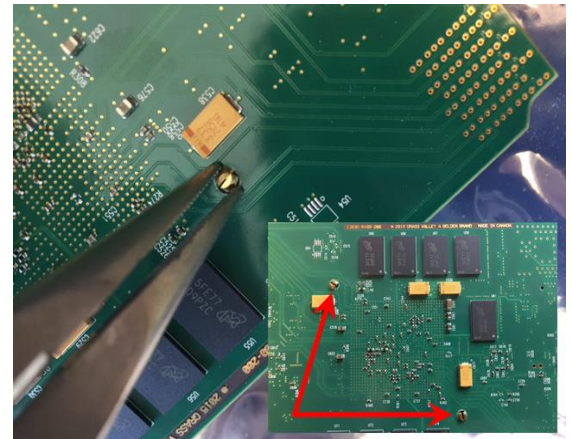


Figure 63–Compressing the Pushpins

3. Using needle-nose pliers, compress the two pushpins so that they unlatch. Push the pin through the card to release it from the assembly.
4. Flip the card back to the component side. Insert the pliers under the one of the pushpin heads. Press down on the center of the fan assembly to prevent it from flipping on its side and gently pry the pin from the heatsink assembly. Repeat for the second pushpin.
5. Remove the wires from both wire clips on the fan assembly.
6. Note the position of the black wire to assist with reconnecting the replacement assembly.
7. Use tweezers to gently disconnect the power connector on the fan assembly from the card.
8. Dispose of the failed fan assembly.

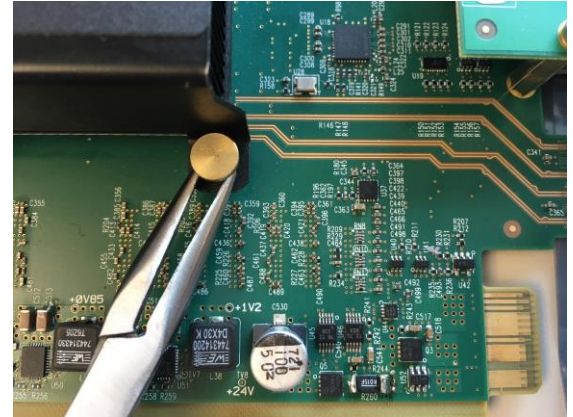


Figure 64—Prying Out the Pushpins

Step 2: Install the new fan assembly

1. Connect the power connector for the replacement fan assembly to the FAN 1 jack on the card.
2. Insert the wires for the fan assembly into the wire clips.
3. Place the fan assembly on the heatsink and align the two pushpins with their respective holes on the card.
4. Press down on the fan assembly to hold it in place and press the pushpins into the holes until they lock into place.

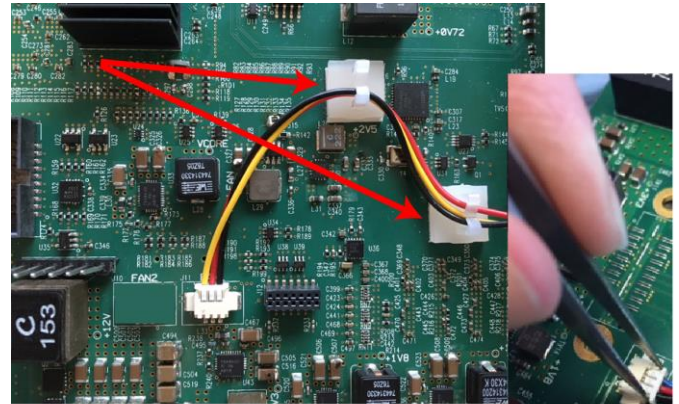


Figure 65—Removing the Wires and Connector

12 Specifications

SDI (Inputs/Outputs); XIP-3901-UC / -DC / -FS Applications

Physical:	16 DIN connectors: 8 IN, 8 OUT
SDI Standard:	SMPTE ST 292 (1.485, 1.485/1.001 Gb/s) SMPTE ST 424 (2.970, 2.970/1.001Gb/s) SMPTE ST 2082-1:2015 (on DIN IN 1 & 5 and OUT 1 & 5)
Supported formats:	HD: SMPTE ST 274: 1080i59.94, 1080i50 HD: SMPTE ST 296: 720p59.94, 720p50 3G: SMPTE ST 425 Level A (mapping 1), level B: 1080p59.94, 1080p50 4K UHD: Quad Link 3 Gb/s SMPTE ST 425-5: 1080p59.94, 1080p50 12G: SMPTE-2082-10: 2160p59.94, 2160p50
Cable length (Belden 1694A):	HD: 250m (820 ft.) at 1.485 Gb/s 3G: 150m (492 ft.) at 2.970 Gb/s 12G: 60m (197 ft.) at 11.88 Gb/s
Jitter:	HD: <0.2 UI (alignment jitter) 3G: <0.3 UI (alignment jitter) 12G: <0.3UI (alignment jitter)

Reference Input; XIP-3901-UC / -DC / -FS Applications

Signal:	SMPTE ST 170 / SMPTE ST 318M / ITU 624-4 blackburst
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Ethernet Port (Control)

Physical:	1 RJ45 port
Standard:	IEEE 802.3 1,000 Mb/s Ethernet

Media Ports

Physical:	Two SFP+ sockets for future use
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Video Processing Performance

Signal path: 10 bits minimum

Latency: No reference: 33 ms (59Hz)
40 ms (50Hz)
With reference: 28 ms to 61 ms (59Hz)
32 ms to 72 ms (50Hz)

3G Output Minimum Delay: Fewer than 4 video lines

Electrical

Power: 60 W maximum

13 Contact Us

Grass Valley Technical Support

For technical assistance, contact our international support center at 1-800-547-8949 (US and Canada) or +1 530 478 4148.

To obtain a local phone number for the support center nearest you, please consult the Contact Us section of Grass Valley's website (www.grassvalley.com).

An online contact form is also available on the [Contact Customer Support](#) page of the website.

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APPENDIX 1 – Local Menu

1st Level	2nd Level	3rd Level	4th Level	Comments/Default Value
Status	Current Application			XIP-3901-UC, XIP-3901-DC, XIP-3901-FS
	ETH3	LINK STATUS		
		IP ADDRESS		
		NETMASK		
		GATEWAY		
		MAC ADDRESS		
FRAME	as per ETH3			
NETWORK CONFIG	ETH3	MODE	STATIC, DHCP, OFF	
		IP ADDRESS	XXX.XXX.XXX.XXX	
		MASK	XXX.XXX.XXX.XXX	
		GATEWAY	XXX.XXX.XXX.XXX	
	FRAME	as per ETH3	as per ETH3	
VERSION	X.Y.Z.B			X major Y minor Z revision B build
	FPGA: X.Y.Z.B			
	UBOOT: X.Y.Z			
APPLICATIONS	XIP-3901-UC vX.Y.Z.B			When present on platform
	XIP-3901-DC vX.Y.Z.B			When present on platform
	XIP-3901-FS vX.Y.Z.B			When present on platform