

# XVP-3901-XC

## Densité Crossconversion

### 3G/HD Crossconverter with Optional Audio Processor

Space-saving, modular platform for advanced signal processing.

The XVP-3901-XC from Grass Valley is a highly integrated, 3G/HD cross-converter with optional video/audio signal processor, which is designed to synchronize, crossconvert and process HD signals for 3G/HD hybrid plants. It is identical to the XVP-3901 except that it does not have up/downconversion capability.

It features a dual 3G/HD input selector and provides multiple outputs of the selected output format. The processor performs all the cross conversion, color space and aspect ratio conversion needed to maintain the chosen output formatting on the outputs, irrespective of whether the input is 3G (Level A or B), HD 1080i or HD 720p.

High quality crossconversion is performed at both 50 and 59.94 Hz, based on multiple sophisticated processing technologies. These include detail enhancement, pixel-based deinterlacing, and advanced motion adaptive deinterlacing and antiringing.

To ensure that the crossconverted video is delivered in the correct aspect ratio when aired, the XVP-3901-XC fully supports AFD. This provides automatic aspect ratio and video size control using embedded commands, and it prevents on-air aspect ratio errors such as the postage stamp effect.

A background keying capability allows side panels (or top and bottom panels) to be filled with graphics to improve on-air presentation for promotions or advertising.

A fiber input/output plug-in cartridge option significantly simplifies fiber installation and configuration. When the fiber cartridge is fitted, the card can select between fiber and BNC inputs and can output both electrical and optical signals simultaneously.

The processor's audio capabilities are equally advanced, with processing of up to 32 channels of audio, with automatic delay to keep lip sync. The processor provides shuffling and down-mixing, and options include automatic loudness control (ALC), dynamic processing (limiter, compressor, and expander), loudness metering, and four AES inputs/outputs for additional flexibility.

The XVP-3901-XC has two on-board sockets for optional modules, including Dolby E encoding, Dolby Digital (AC-3) encoding, Dolby E/Dolby Digital (AC-3) decoding, and upmixing using Linear Acoustic upMAX technology. Grass Valley also offers a module that provide ALC. This module features the award-winning technology of AEROMAX by Linear Acoustic which is capable of maintaining constant loudness across different audio programs (see Automatic Loudness Control (ALC) datasheet).

There are many benefits to the XVP-3901-XC's high level of feature integration. A lower purchase cost per channel is obviously highly desirable but there are many other dimensions to cost savings that are readily achievable. These include reduced space and cooling costs, less cabling, and a reduced spares inventory. By simplifying video and audio synchronization, and reducing the number of vendors, the system integration is also simplified significantly.

The XVP-3901-XC can be upgraded in the field to the full XVP-3901 specification with up/down/cross conversion capability.

## KEY FEATURES

### Video

- Cross/ARC converter with frame sync (50/59.94 Hz)
- Offers a multirate 3G/HD input and 3G/HD outputs
- Supports 3G level A (mapping 1) and level B
- Flexible HD/SD/URS reference input
- Advanced video deinterlacing for best image quality
- One frame of processing delay for all conversions
- Automatic ARC using AFD (SMPTE ST 2016), video index (SMPTE RP 186) and WSS, with custom and fixed presets
- Keyer option for filling black pillars and letter box
- Built-in proc amp with YUV/RGB color correction and legalizer
- Processes and converts ancillary data such as CC (CEA-608/CEA-708), timecode, teletext/OP-47 and SCTE 104 (SMPTE ST 2010)
- Inserts V-Chip and CGMS in XDS of CC (CEA-608)
- Optional SFP optical plug-in cartridges to select between fiber and BNC inputs and output both electrical and optical signals simultaneously

- Serial and GPIO ports for automation control
- Upgradeable to full XVP-3901 specification
- Dual fingerprint generation to monitor lip sync on SD and HD outputs

### Optional Audio

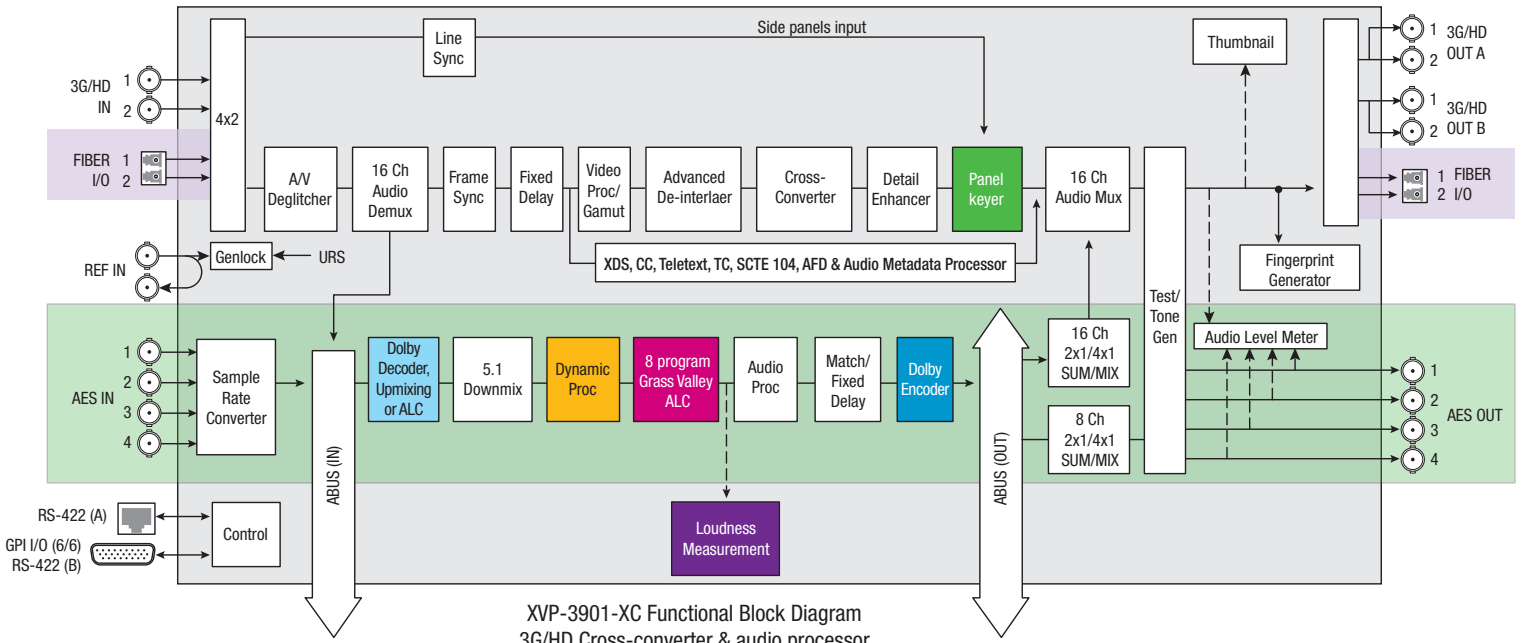
- 16 channels embedded audio processing (32 channels internal)
- 4 AES inputs, 4 AES outputs
- Automation capabilities based on audio signal type detection
- Audio down mix: 5.1 surround to Lt/Rt or Lo/Ro
- Optional audio dynamic processor (compressor/limiter/expander)
- Optional automatic loudness control with Grass Valley wideband processing (on-board)
- Optional loudness measurement of up to 4 audio programs and logging with iControl for end-to-end loudness monitoring solutions

- Loudness solution compliant to EBU R128, A/85 ITU-R BS.1770-3 and ARIB TR-B32
- Dolby E compatible
- Audio metadata processing (SMPTE ST 2020-A)
- Perfect audio/video sync plus additional audio user delay of up to 2 seconds
- Compatible with Grass Valley audio processing cards using ABUS
- Compatible with iControl multipoint A/V fingerprint analyzer for lip sync measurement
- On-board socket for 2 optional modules expansions:
  - Dolby E and Dolby Digital decoder
  - Dolby Digital and Dolby Digital Plus encoder
  - Dolby E encoder
  - Linear Acoustic upMAX
  - Linear Acoustic AEROMAX automatic loudness control

### XVP-3901-XC

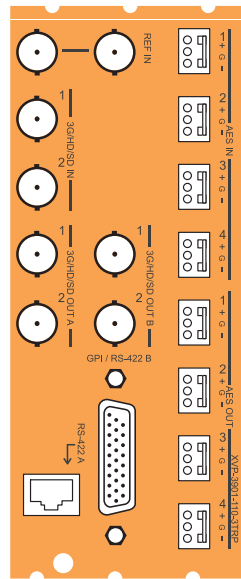
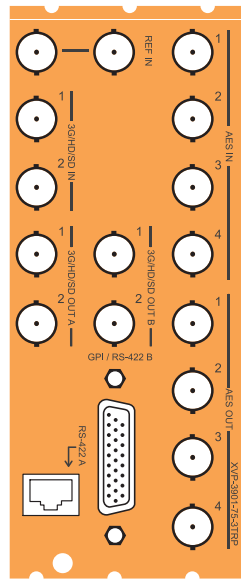
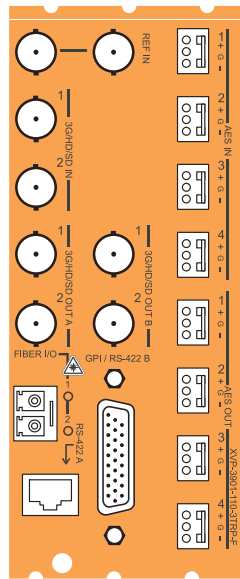
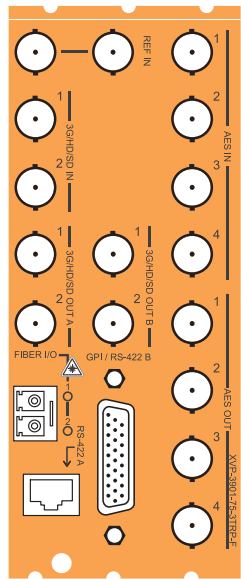
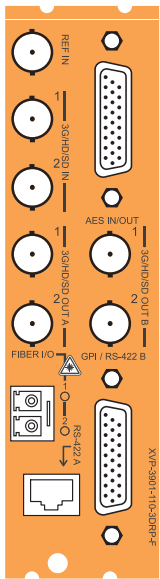
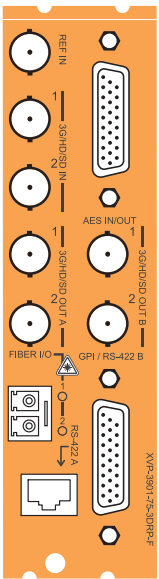
Input \ Output		HD				3G	
		720p50	720p59.94	1080i50	1080i59.94	1080p50	1080p59.94
HD	720p50	X		X		X	
	720p59.94		X		X		X
	1080i50	X		X		X	
	1080i59.94		X		X		X
	1080p23.98		X		X		X
	1080pSF23.98		X		X		X
	1080p25	X		X		X	
	1080p29.97		X		X		X
3G	1080p50	X		X		X	
	1080p59.94		X		X		X

Video Formats Supported.



XVP-3901-XC Functional Block Diagram  
3G/HD Cross-converter & audio processor

VIDEO OPTIONS	XVP-3901-110/75-3TRP-F and 3DRP-F (with appropriate fiber cartridge)	AUDIO OPTIONS	XVP-3901-OPT-AUD	XVP-3901-OPT-DP	MOD-DOLBY-DEC-2	MOD-LA-ALC
	XVP-3901-OPT-K		XVP-3901-OPT-ALC	XVP-3901-OPT-LM	MOD-LA-DUP-701	MOD-DOLBY-ENC-D-2
					MOD-DOLBY-ENC-E-2	



XVP-3901-75-3DRP-F

XVP-3901-110-3DRP-F

XVP-3901-75-3TRP-F

XVP-3901-110-3TRP-F

XVP-3901-75-3TRP

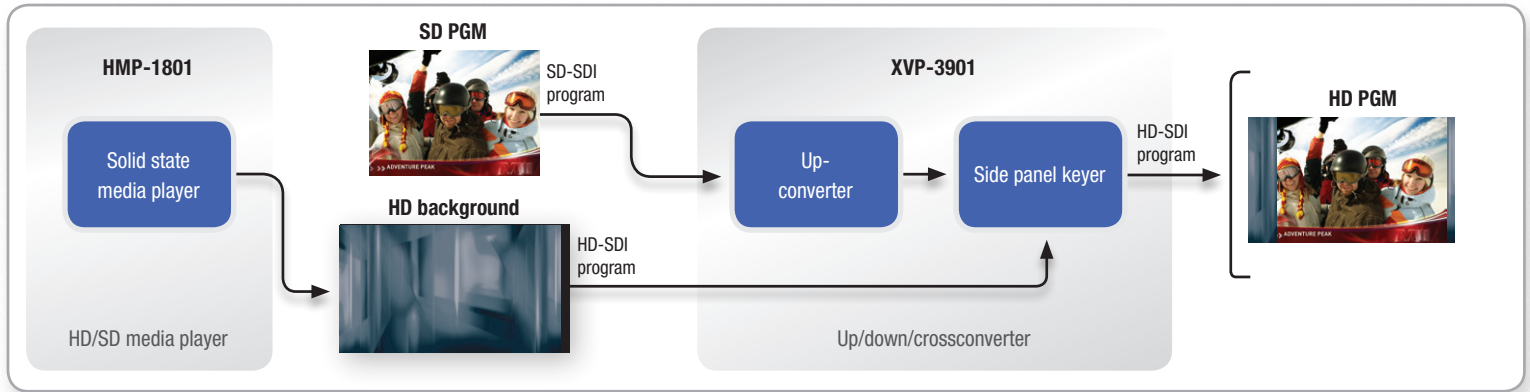
XVP-3901-110-3TRP

## Up/Downconversion with Background Keying

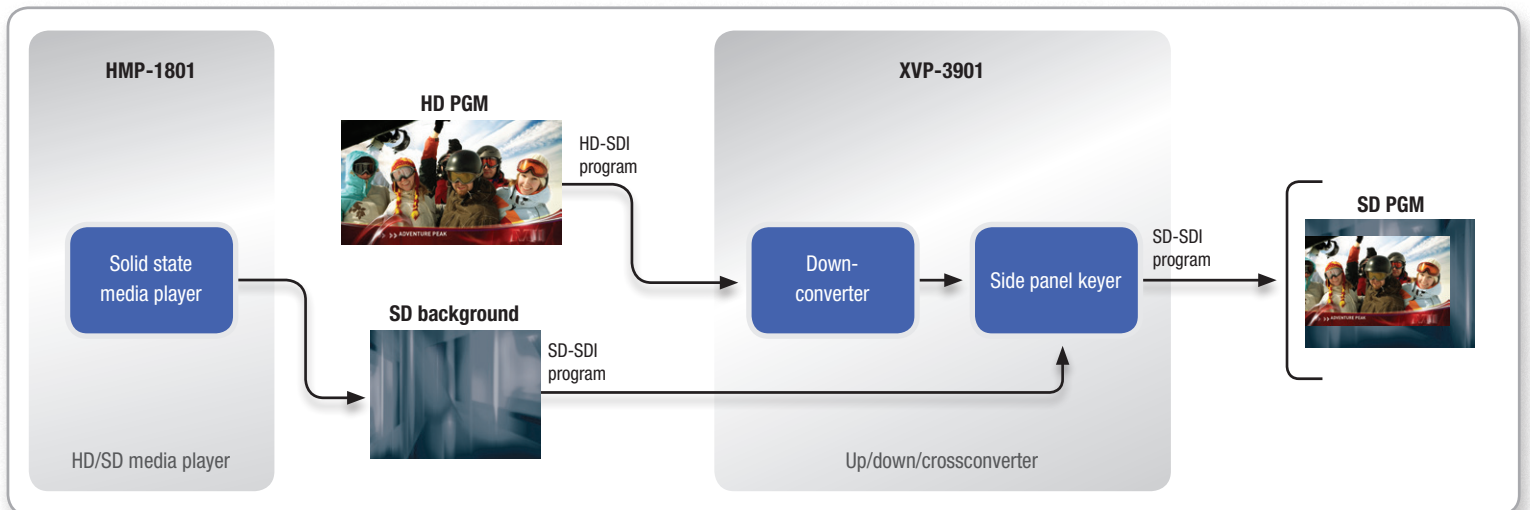
### Up/downconversion with background keying using XVP-3901 and HMP-1801:

The XVP family of interfaces features a background keying capability which allows side panels or letterbox black bars, introduced by upconversion or downconversion, to be filled with video or graphics using the HMP-1801 media player module.

### Upconversion with background keying using XVP-3901 and HMP-1801



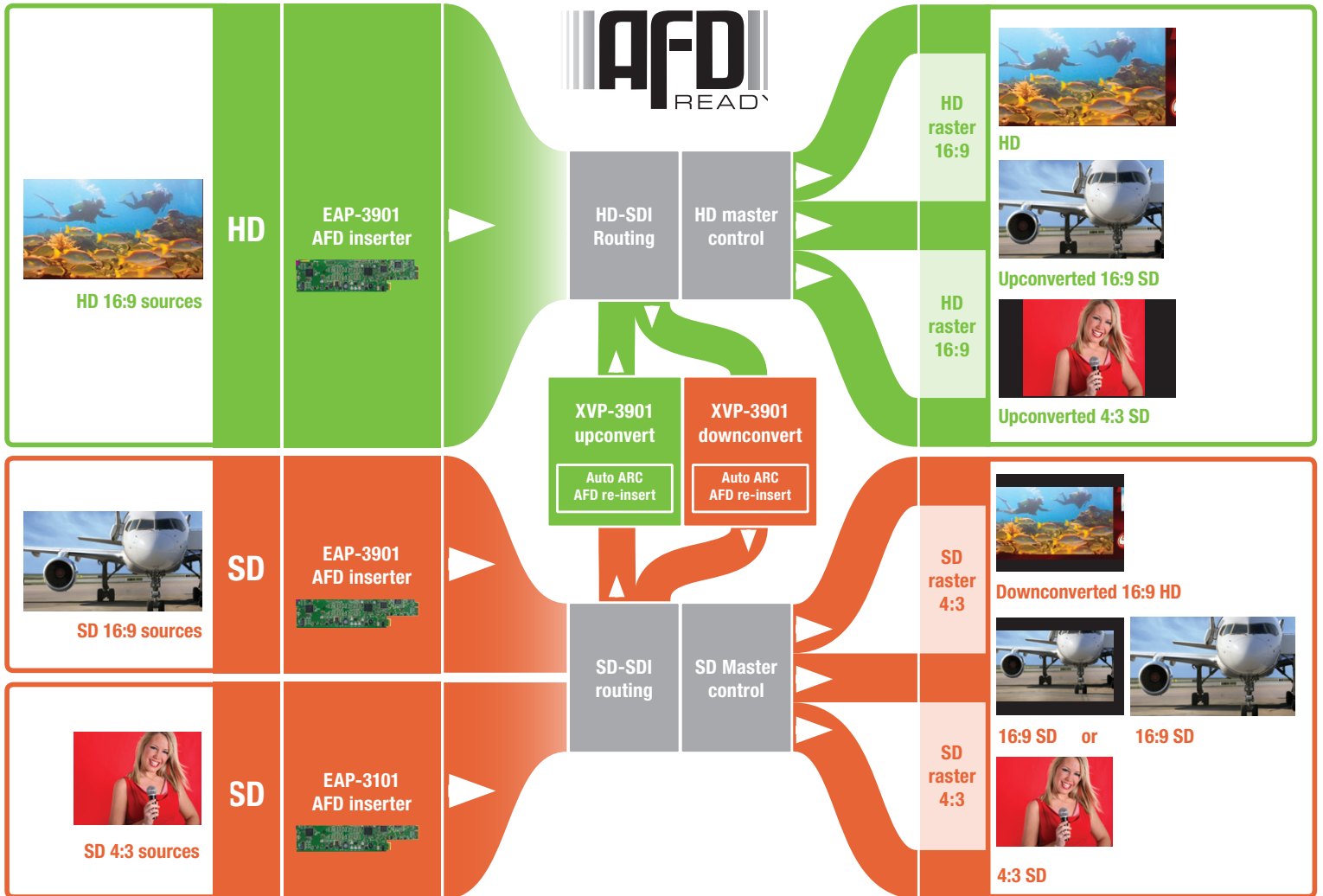
### Downconversion with background keying using XVP-3901 and HMP-1801



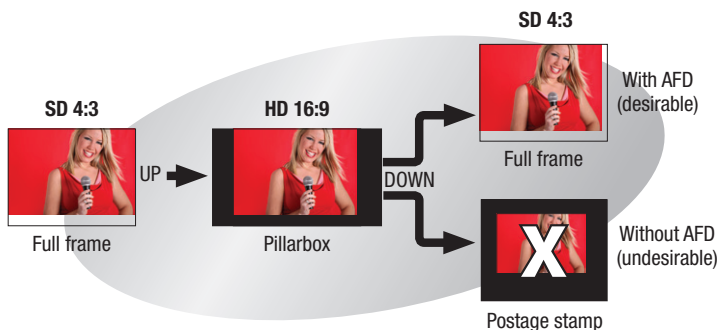
## Frame Accurate Aspect Ratio Conversion with AFD

Frame accurate Aspect Ratio Conversion (ARC) can be performed automatically using embedded signaling based on the Active Format Description (AFD) standard. AFD data can be easily embedded in a signal by the Densité XVP processor family, and by the EAP-3901 embedder. With AFD, original image information is maintained throughout the entire conversion process for optimal viewing following 4:3 and 16:9 aspect ratio conversion.

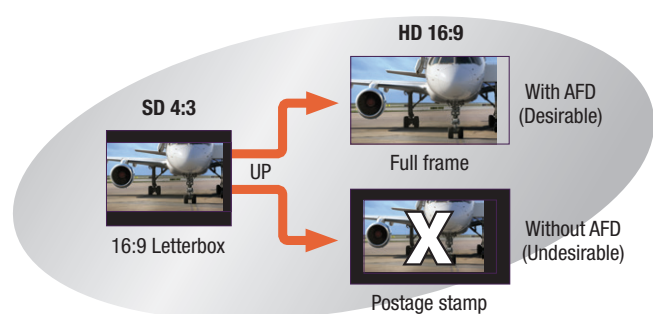
For example, processing three input source formats (16:9 HD, 16:9 SD and 4:3 SD) in a typical HD/SD hybrid plant results in six different output possibilities. However, using automatic aspect ratio control based on AFD will prevent the ARC errors that may occur with manual control.



### 4:3 aspect ratio conversion with AFD

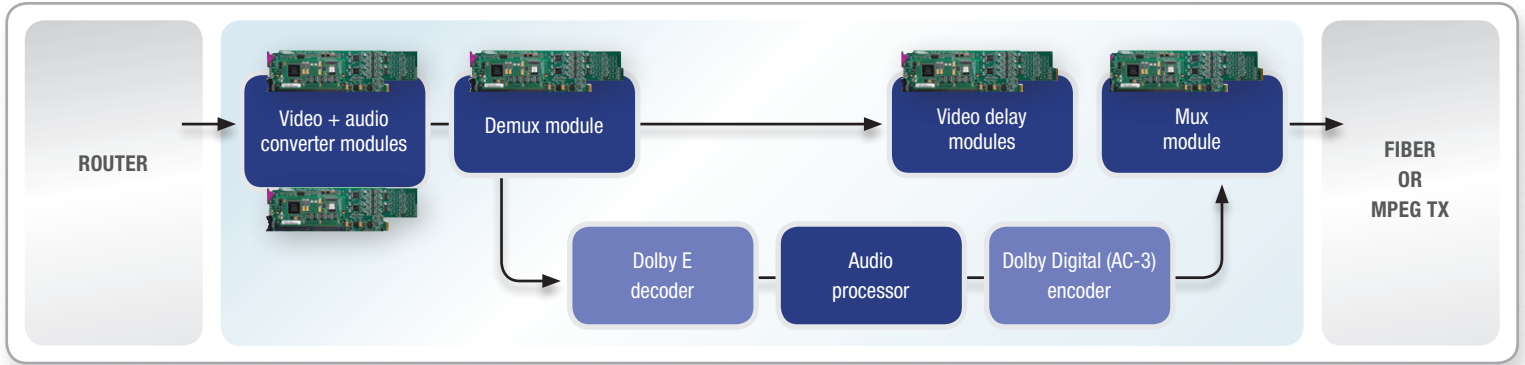


### 16:9 aspect ratio conversion with AFD

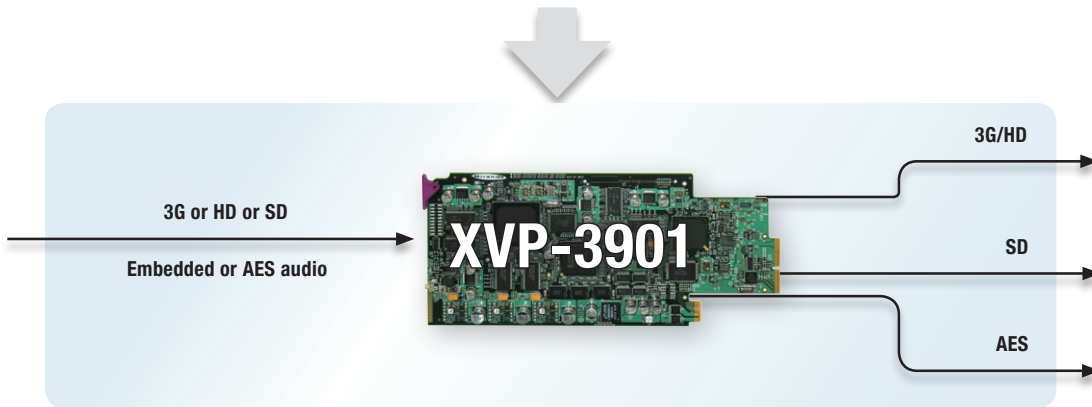


## Incoming Feed Processing

Using the XVP-3901 significantly reduces the amount of equipment required for incoming feed processing. A single XVP-3901 replaces multiple single function devices to provide Dolby E decoding, audio processing and Dolby Digital or Dolby Digital Plus encoding.



Traditional approach to Dolby E decoding and Dolby Digital or Dolby Digital Plus encoding using multiple devices.



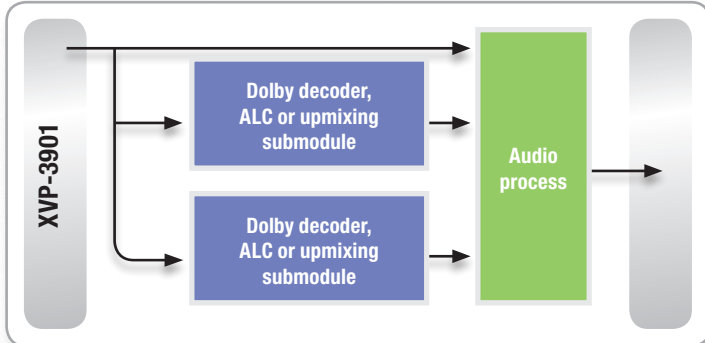
Using a single XVP-3901 3G/HD/SD up, down and cross converter with audio processor for incoming feed processing.

Incoming Feed Problems	XVP-3901 Features
Remote feeds need to be adapted to station infrastructure	Frame synchronization, full proc controls, color correction and legalizer
Multiple audio formats and audio synchronization: Mixed up audio tracks Lip sync Dolby E and Dolby Digital encoded inputs 5.1 audio Loudness level	Extraction, processing and re-insertion for up to 4 embedded audio groups Video to audio match delay and fixed delay Audio track mixing and shuffling Discrete audio inputs/outputs handled using complimentary audio modules Dolby Metadata insertion, and will delay Dolby E audio without compromising encoded signal Decode Dolby E or Dolby Digital to discreet PCM channels Audio downmix from 5.1 audio to a Lt Rt or Lo Ro audio 2 channel signal Stereo to 5.1 upmixing using Linear Acoustic technology Automatic loudness control
Receiving SD or HD signals at different times of the day	Built-in up and downconversion automatically converts current input to house format
Receiving 1080i into 720p plant (or vice versa)	Built in 720p to/from 1080i crossconversion eliminates need for costly external converters
Providing 16:9 and 4:3 aspect ratio conversion	Automatic, frame accurate aspect ratio conversion using embedded signaling, based on the Active Format Description (AFD) standard Background keying capability to fill side or top/bottom panels with graphics

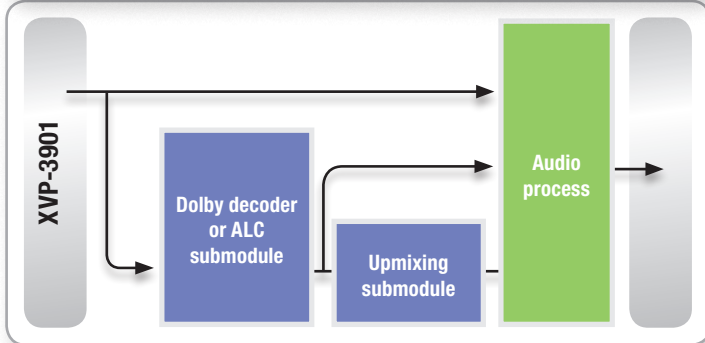


## Flexible 5.1 Audio Processing

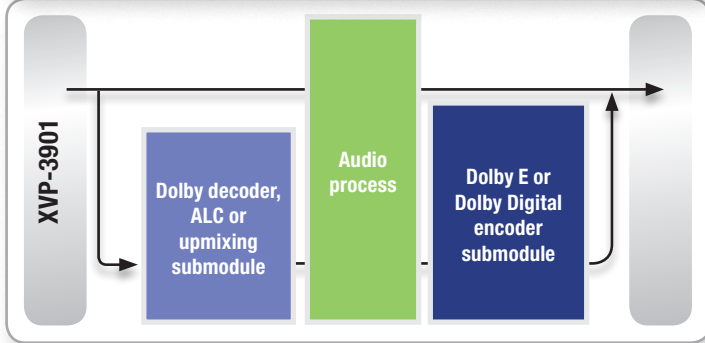
The XVP-3901 can provide very versatile audio processing sequences, due to the flexibility of the optional audio submodules. The submodules include Dolby E decoding, Dolby Digital decoding, Dolby E encoding, Dolby Digital and Dolby Digital Plus encoding, Linear Acoustic upMAX 2.0 to 5.1 upmixing and automatic loudness control (ALC). Two audio submodules can be fitted to an XVP-3901 processor. All audio channels created by the modules are preserved, and can be selected in the output shufflers and mixers for embedding or discrete AES outputs.



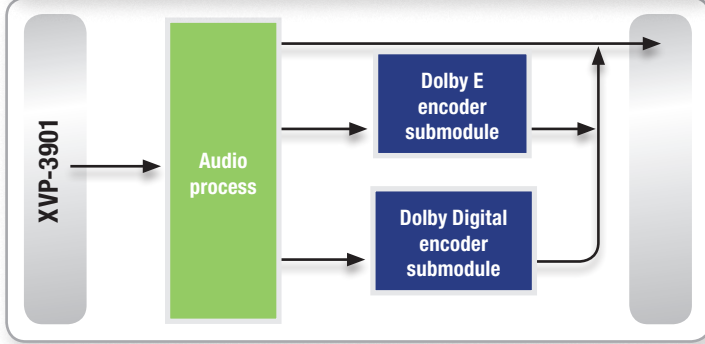
Dolby E / Dolby Digital (AC-3) decoding, automatic loudness control (ALC) or upmixing (or a different combination of these submodules) used in parallel ahead of audio processing.



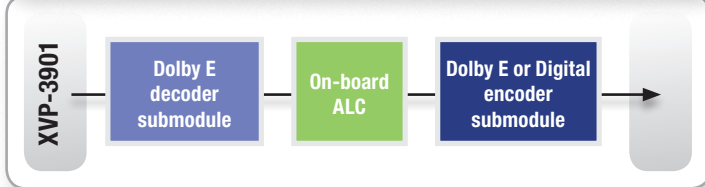
Dolby E / Dolby Digital (AC-3) decoding, ALC or upmixing (or a different combination of these submodules) followed by upmixing ahead of audio processing.



Dolby E / Dolby Digital (AC-3) decoding, ALC or upmixing followed by audio processing, and subsequently Dolby E or Dolby Digital (AC-3) encoding.



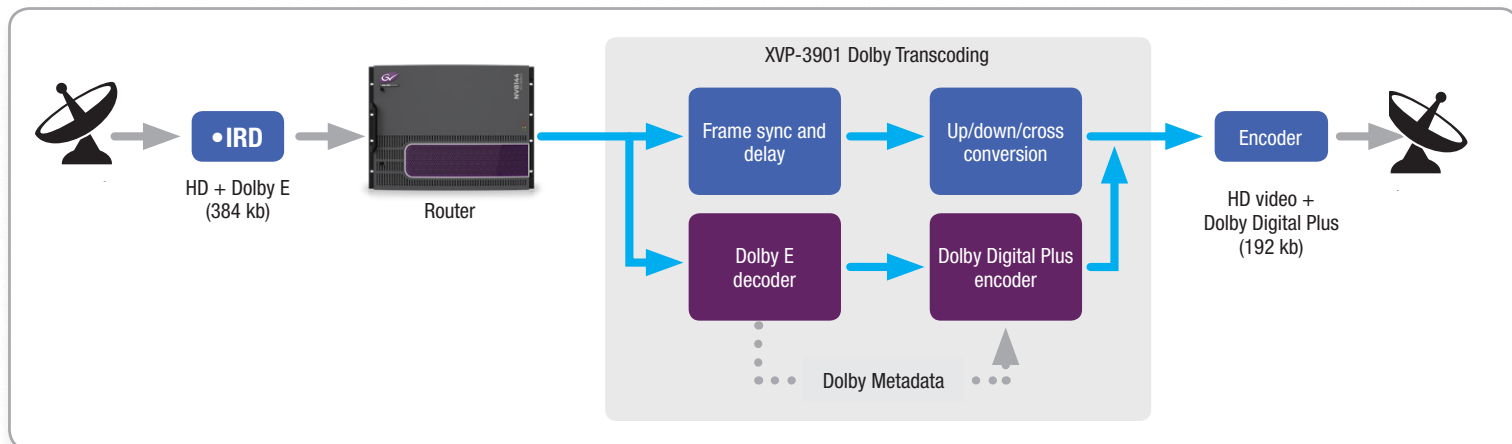
Dolby E and Dolby Digital (AC-3) encoding (or a different combination of these submodules) used in parallel after audio processing.



Dolby E decoding, ALC followed by Dolby E or Dolby Digital encoding.

## Dolby Digital Plus Transcoding

The addition of Dolby Digital Plus to the Dolby Digital encoder means that Grass Valley's audio processing module will provide the same high-quality audio compression they always have, but at a data rate as much as 50 percent lower than currently required, enabling 5.1 multichannel audio at rates as low as 192 kb/s. When combining Dolby E decoding and Dolby Digital Plus encoding, broadcasters can deliver an efficient multichannel surround sound across multiple platforms and content types.



### SPECIFICATIONS

#### Video Input (2) / Output (2)

##### Signal:

SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)  
SMPTE ST 424 (2.970, 2.970/1.001 Gb/s)

##### Supported formats:

HD: SMPTE ST 274: 1080i59.94/50  
HD: SMPTE ST 296: 720p59.94/50  
3G: SMPTE ST 425 level A (mapping 1), level B:  
1080p59.94/50

##### Cable length:

150m (492 ft.) Belden 1694A at 1.485 Gb/s  
120m (393 ft.) Belden 1694A at 2.970 Gb/s

##### Return loss: >15 dB up to 3 GHz

##### Jitter:

HD: <0.2 UI (alignment jitter)  
3G: <0.3 UI (alignment jitter)

#### Reference Input

##### Signal:

SMPTE ST 170/SMPTE ST 318/ITU 624-4 blackburst  
SMPTE ST 274/SMPTE ST 296 tri-level sync

##### Return loss: >35 dB up to 5.75 MHz

#### Video Processing Performance

##### Signal path: 10 bits minimum

##### Latency: 1 frame in all modes

##### Additional delay: up to 15 frames

#### Audio Input (4)

##### Sampling freq.: 32 to 96 kHz

##### Quantization: up to 24 bits

##### AES3

Level: 0.2 to 7 Vp-p  
Impedance: 110Ω balanced

##### AES3-id

Level: 0.2 to 2 Vp-p  
Impedance: 75Ω

Return loss: 15 dB at 6 MHz

#### Audio Output (4)

##### Sampling freq.: 48 kHz

##### Quantization: 24 bits

##### AES3

Level: 2.75 Vp-p  
Impedance: 110Ω balanced

##### AES3-id

Level: 1.0 Vp-p  
Impedance: 75Ω  
Return loss: 15 dB at 6 MHz

#### Audio Processing Performance

##### Quantization: 24 bits

##### Sampling: 48 kHz, synchronous

##### Number of channels: 16, 8 pairs, 4 groups

##### Freq. response: ±0.02 dB (20 Hz to 20 kHz)

##### SNR: 123 dB (A-weighted)

##### THD-N: -138 dB (20 Hz to 20 kHz)

#### Miscellaneous

##### Fixed delay: 0 to 2.0 s

##### Step: 1 ms (coarse), 1 sample (fine)

#### GPI

##### Connector: 26-pin D-Sub, optoisolated

##### GPI in: Input selection: 1-2

##### Presets: 1-4

##### GPI out: Selected input: 1-2

##### Selected preset: 1-4

#### RS-422 A (automation)

##### Connector: RJ-45

##### Signal: OXTEL series automation protocol

#### RS-422 B (audio metadata)

##### Connector: 26-pin D-Sub

##### Signal: RDD6

#### ABUS Connector

##### As per ABUS standard, Grass Valley

#### Fiber

Full specifications available on SFP optical plug-in cartridges webpage and datasheet.

#### Test Pattern Generator

##### Video: Color bars – 100% white bar with 75% color

#### Audio:

Left channel pulsed 1 kHz tone  
Right channel steady 1 kHz tone

#### Electrical

##### Power: 25W





**ORDERING****Densité 3 frame****XVP-3901-XC**

XVP-3901-75-3DRP-F  
 XVP-3901-110-3DRP-F  
 XVP-3901-75-3TRP-F  
 XVP-3901-110-3TRP-F  
 XVP-3901-75-3TRP  
 XVP-3901-110-3TRP

**Options (software)**

XVP-3901-OPT-AUD  
 XVP-3901-OPT-K  
 XVP-3901-OPT-DP  
 XVP-3901-OPT-LM  
 XVP-3901-UG-XC2XVP  
 XVP-3901-OPT-ALC-2  
 XVP-3901-OPT-ALC-6  
 XVP-3901-OPT-ALC-8  
 XVP-3901-OPT-ALC-16

**Description****3G/HD cross converter with optional audio processor**

Double rear connector panel, 75Ω and fiber connector  
 Double rear connector panel, 110Ω and fiber connector  
 Triple rear connector panel, 75Ω and fiber connector  
 Triple rear connector panel, 110Ω and fiber connector  
 Triple rear connector panel, 75Ω  
 Triple rear connector panel, 110Ω

**Description**

AES IO support and 16 channels on-board audio processing option  
 Background key input option  
 Dynamic audio processing option  
 Loudness meter option  
 Upgrade from XVP-3901-XC to full XVP  
 2-channel on-board ALC option by Grass Valley  
 6-channel on-board ALC option by Grass Valley  
 8-channel on-board ALC option by Grass Valley  
 16-channel on-board ALC option by Grass Valley

**Options (hardware)**

SFP-R-LC  
 SFP-RR-LC  
 SFP-RT-S13-LC

Other types of SFP Optical Plug-In Cartridges may be available for this product. Please visit [www.grassvalley.com](http://www.grassvalley.com) for more information.

NSH26M  
 BOC-DA26-8BNC-1  
 MOD-DOLBY-ENC-E-2  
 MOD-DOLBY-ENC-D-2  
 MOD-DOLBY-DEC-2  
 MOD-LA-DUP-701  
 MOD-LA-ALC-2  
 MOD-LA-ALC-6  
 MOD-LA-ALC-8  
 MOD-LA-ALC-2-DUP  
 MOD-LA-ALC-6-DUP  
 MOD-LA-ALC-8-DUP

Remote control

**Description**

Single fiber Rx (input) cartridge with LC/PC connector  
 Dual fiber Rx (input) cartridge with LC/PC connector  
 Dual fiber Rx/Tx (input/output) cartridge 1310 nm with LC/PC connector

HD-26 to terminal block adapter  
 75Ω digital audio breakout cable  
 Dolby E encoder  
 Dolby Digital and Dolby Digital Plus encoder  
 Dolby E and Dolby Digital decoder  
 Upmixing using Linear Acoustic Technology upMAX  
 2-channel ALC licensed by Linear Acoustic  
 6-channel ALC licensed by Linear Acoustic  
 8-channel ALC licensed by Linear Acoustic  
 2-channel ALC and upmix licensed by Linear Acoustic  
 6-channel ALC and upmix licensed by Linear Acoustic  
 8-channel ALC and upmix licensed by Linear Acoustic  
 iControl, iControl Solo, RCP-200

DS-PUB-2-0207A-EN



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