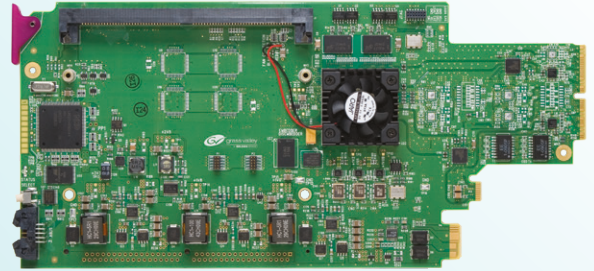


# EAP-3901

## 3G/HD/SD Embedded Audio and Metadata Processor



Space-saving, modular platform for advanced signal processing.

The EAP-3901 from Grass Valley<sup>®</sup> is an advanced embedded audio processor that can simultaneously process up to 32 channels of audio (16 channels of embedded audio from the video, plus others generated internally). Functions include down-mixing, proc amp, channel shuffling, mixing and loudness measurement. Options include automatic loudness control (ALC) and dynamic processing (limiter, compressor and expander).

The loudness measurement function allows the measurement and logging of up to four audio programs with iControl™ loudness monitoring software to analyze and report compliance with respect to various loudness regulations around the world.

It has one on-board socket for optional modules, which can offer Dolby decoding, Dolby encoding and stereo upmixing using Linear Acoustic upMAX technology. One other module provides ALC using AEROMAX technology by Linear Acoustic, capable of maintaining

constant loudness across different audio programs.

The card will pass and delay automatically all 32 internal audio channels to preserve lip sync between the channels. Each channel can be delayed independently to correct any lip sync issues. All audio channels can be mixed and shuffled to provide 16 channels for embedding in the video output.

An automatic preset recall feature provides basic automation to select user preset based on the status of the incoming audio.

When genlocked to an external reference or to the frame reference using the internal URS signal, the EAP-3901 can handle video hot switches at the input without losing sync at the output. In absence of the video input, the card can freeze the output to the last good frame, field or black.

The card has a frame buffer (not a frame sync), which allows an increase in the video delay of up to 15 frames to compensate for the long

audio processing delay required by some modules. For applications that require a small processing delay, the frame buffer can be bypassed to reduce the delay to a few microseconds.

The EAP-3901 has three GPIOs that can be used as input or output to embed or extract GPI events to/from the timecode user bits in transport applications, or they can be used simultaneously to trigger the card's user presets.

Dolby metadata insertion in the VANC is possible from multiple sources, such as a Dolby E decoder module, an embedded VANC stream, an external RS-422 link or from the integrated metadata generator. All parameters in the metadata stream can be probed and monitored. Dolby metadata can be used to steer the behavior of the audio downmix and upmix modules.

The EAP-3N01-3SRP-R rear module has a bypass relay that can be used to bypass the main input to the output if the card fails, loses power or if the card is removed.

# Key Features

## Video

- 3G/HD/SD input
- Supports 3 Gb/s level A (mapping 1) and level B
- Audio/video de-glitcher to handle video hot switch at the input
- Automatic detection of input video loss and switchover to local grey for continuity of embedded audio
- Flexible HD/SD/URS reference input
- Minimum processing delay of 8 μs, but additional delay can be added up to 15 frames
- Bypass relay with EAP-3N01-3SRP-R rear module
- Optional optical fiber IO module with EAP-3N01-3SRP-F rear module

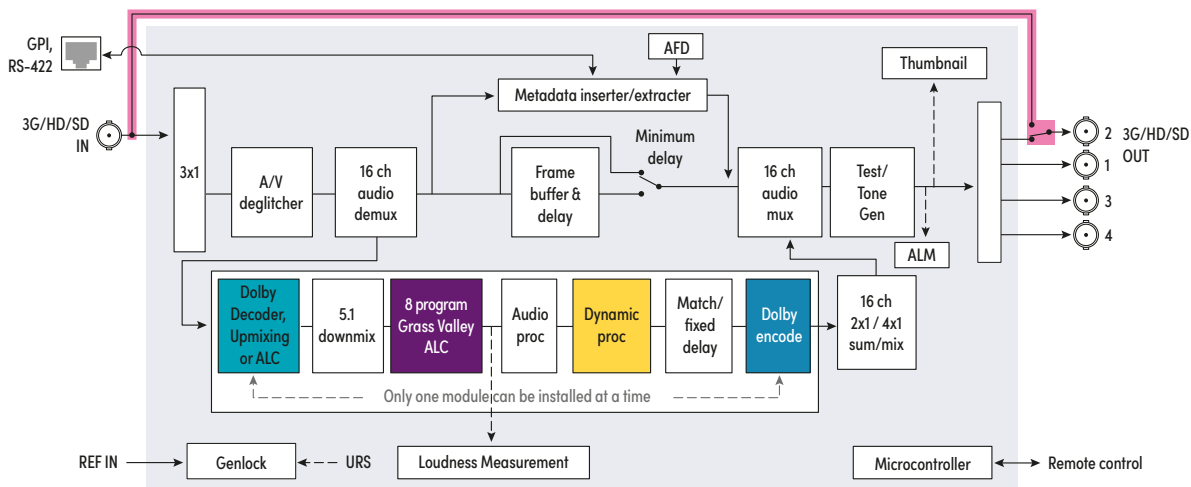
## Metadata

- AFD (SMPTE ST 2016), VLI (RP-186) and WSS insertion
- Audio metadata insertion and extraction (SMPTE ST 2020-A)
- RS-422 serial data input and output to carry audio metadata
- 3 GPI I/O that can be inserted or extracted in the timecode user bits, they can also be used for automation, user preset recall and loudness reset

## Audio

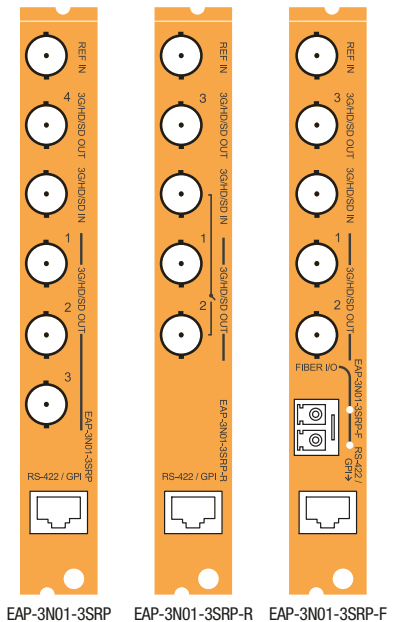
- Full audio shuffling and mixing on a channel basis
- 32 channels internal audio processing
- Automation capabilities based on audio signal type detection
- Audio 5.1 surround downmix to Lt/Rt or Lo/Ro
- Audio dynamic processor option (compressor/limiter/expander)

- Optional on-board automatic loudness control with Grass Valley Wideband processing
- Loudness measurement of up to four audio programs and logging with iControl™ loudness monitoring option
- Loudness compliant to EBU R128-2014, ATSC A/85:2013 (FCC CALM compliant) and ARIB TR-B32 (ITU-R BS.1770-3)
- Audio delay adjustments of up to 2 seconds to compensate for lip sync issues
- On-board socket for one optional module expansion:
  - 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



EAP-3901 Functional Block Diagram

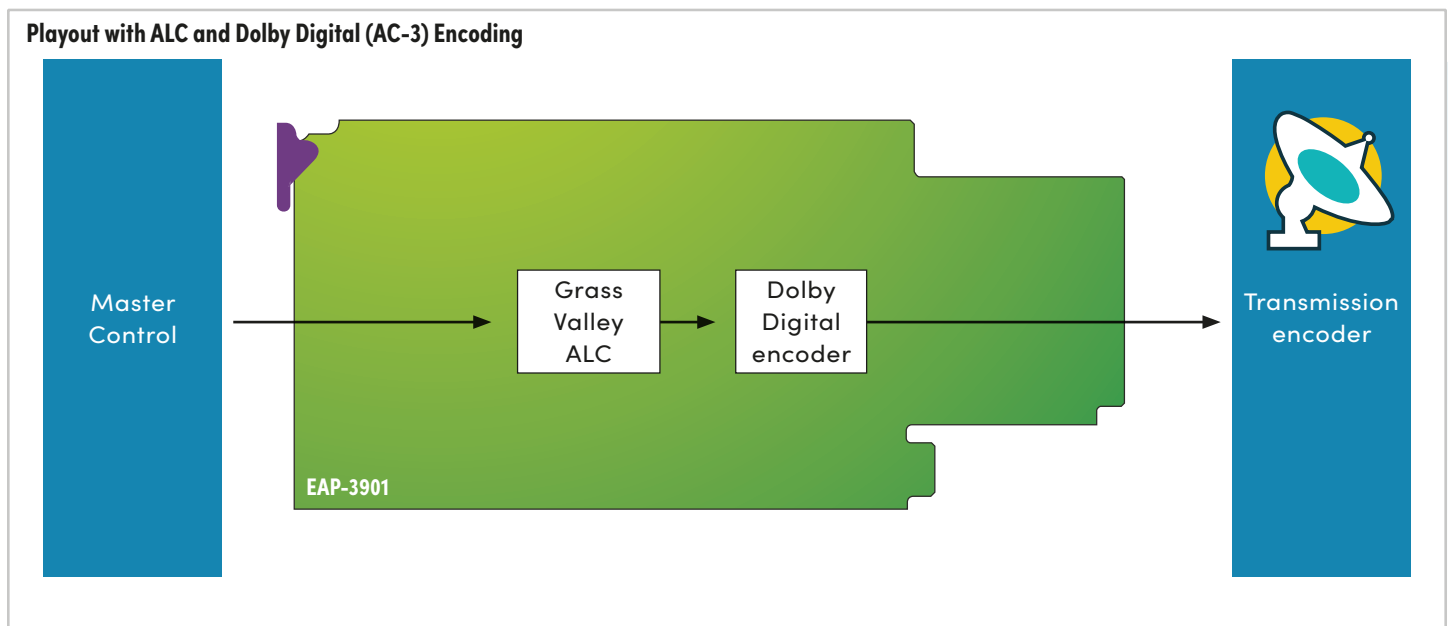
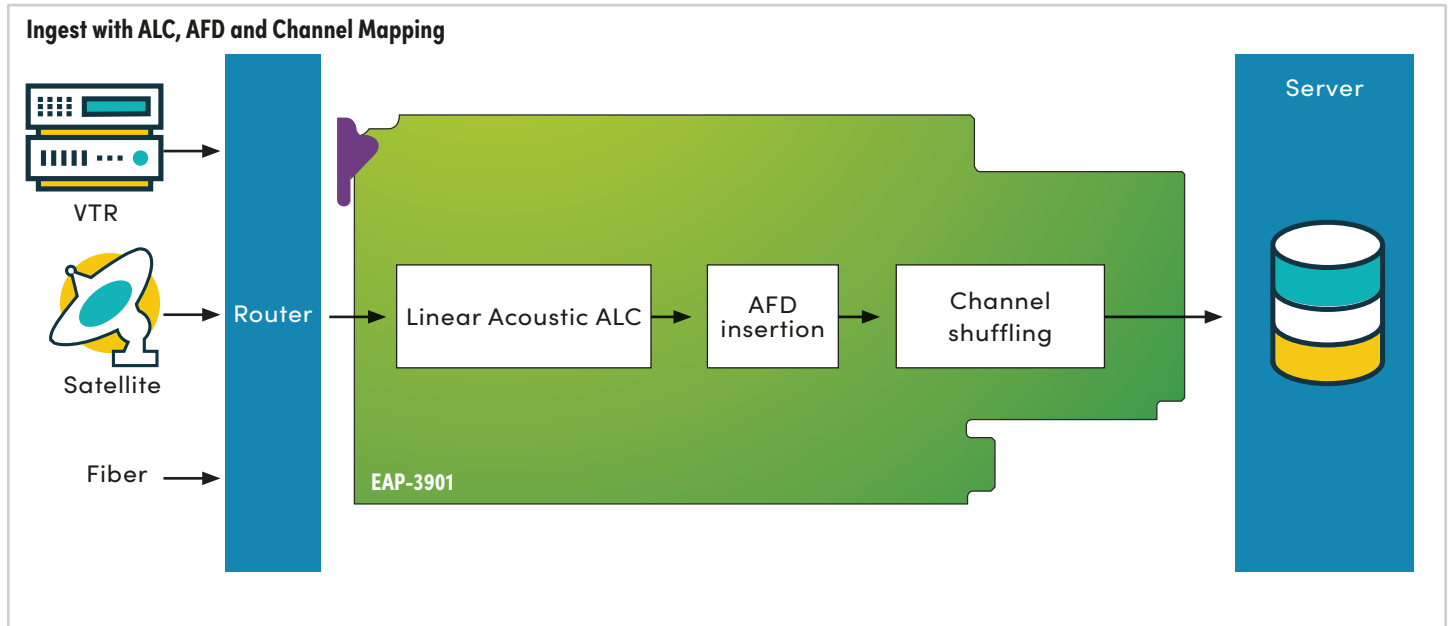
Options (hardware & software)		
<span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span>	EAP-3901-OPT-DP	<span style="background-color: lightblue; border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> MOD-DOLBY-ENC-E-2
<span style="background-color: purple; border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span>	EAP-3901-OPT-ALC	<span style="background-color: cyan; border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> MOD-DOLBY-ENC-D-2
		<span style="background-color: teal; border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> MOD-LA-ALC
		<span style="background-color: lightcyan; border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> MOD-LA-DUP-701
		<span style="background-color: darkcyan; border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> MOD-DOLBY-DEC-2



The EAP-3N01-3SPR-F rear module has a fiber input/output cartridge. Once the cartridge is installed, the inputs or outputs are selectable through the control interface. The input of the card allows you to select between fiber and copper inputs. The outputs are via copper and fiber simultaneously (with appropriate fiber cartridge).

There are many benefits to the EAP-3901'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.

## Typical Audio Processing Applications



## Specifications

### Video Input/Output

#### Signal (1):

SMPTE ST 259-C (270 Mb/s)  
 SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)  
 SMPTE ST 424 (2.970, 2.970/1.001 Gb/s)

#### Supported formats:

SD: 480i59.94, 576i50  
 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

#### Cable length\*:

300m (984 ft.) Belden 1694A at 270 Mb/s  
 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/SD: <0.2 UI  
 3G: <0.3 UI

### 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

#### GPIO

#### Signal (3):

Contact closure to ground

#### Connector:

RJ45

#### Direction:

Bidirectional (application specific)

#### RS-422

#### Signal (2):

RS-422

#### Input level:

300 mVp-p (min)

#### Output level:

3 Vp-p (min)

#### Rate:

115,200 Bd

### Video Processing Performance

#### Signal path:

10 bits

#### Processing delay (HD):

8  $\mu$ s (in minimum delay mode)

#### Additional delay:

Up to 15 frames upon user selection

### Audio Processing Performance

#### Quantization:

24 bits

#### Sampling:

48 kHz, synchronous

#### Audio latency:

2 to 6 ms in minimum processing delay depending on processing options

#### Audio delay:

Up to 2s (1 ms steps)

### Electrical

#### Power:

12.5W

\* Cable length and return loss specifications will be reduced when using the output protected by the bypass relay on EAP-3901-3SRP-R rear. Refer to the manual for more details.



## Ordering

### Densité 3 frame

#### EAP-3901

#### EAP-3N01-3SRP

#### EAP-3N01-3SRP-R

#### EAP-3N01-3SRP-F

### Options (Software)

#### EAP-3901-OPT-DP

#### EAP-3901-OPT-ALC-2

#### EAP-3901-OPT-ALC-6

#### EAP-3901-OPT-ALC-8

#### EAP-3901-OPT-ALC-16

### Options (Hardware)

#### SFP-RR-LC

#### SFP-TT-S13S13-LC

#### SFP-R-LC

#### SFP-T-S13-LC

#### SFP-RT-S13-LC

Other types of SFP Optical Plug-In Cartridges may be available for this product.

### Description

3G/HD/SD embedded audio and metadata processor

Single rear connector panel

Single rear connector panel with bypass relay

Single rear connector panel with fiber connector

### Description

Dynamic audio processing option

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

### Description

Dual fiber Rx (input) cartridge with LC/PC connector

Dual fiber Tx (output) cartridge at 1310 nm with LC/PC connector

Single fiber Rx (input) cartridge with LC/PC connector

Single fiber Tx (output) cartridge at 1310 nm with LC/PC connector

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

### 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

Dolby E encoder

Dolby digital (AC-3) encoder

Dolby E and digital (AC-3) 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

GV Orbit<sup>®</sup>, iControl, iControl Solo

This product may be protected by one or more patents. For further information, please visit: [www.grassvalley.com/patents](http://www.grassvalley.com/patents)

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