

# EAP-3901

## 3Gbps/HD/SD embedded audio and Metadata processor



The EAP-3901 is an advanced embedded audio processor which 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 and mixing. Options include Automatic Loudness Control, dynamic processing (limiter, compressor, and expander) and loudness metering. A new lip sync option generates audio/video fingerprints to detect and measure lip sync errors in a broadcast facility.

It has one on-board socket for optional modules, which can offer Dolby decoding, Dolby encoding and stereo upmixing using Linear Acoustic upMAX™ technology. Two new modules provide Automatic Loudness Control (ALC), using the AEROMAX™ technology by Linear Acoustic, or Level Magic™ by Jünger Audio. Both solutions are capable of maintaining constant loudness across different audio programs (see page 78).

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.

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 which require a small processing delay, the frame buffer can be bypassed to reduce the delay to a few micro-seconds.

The EAP-3901 has 3 GPIO that can be used as input or output to embed or extract GPI events to/from the Time Code 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 behaviour of the audio downmix and upmix modules.

The EAP-3901-3SRP-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.

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.

### KEY FEATURES AND BENEFITS

#### Video

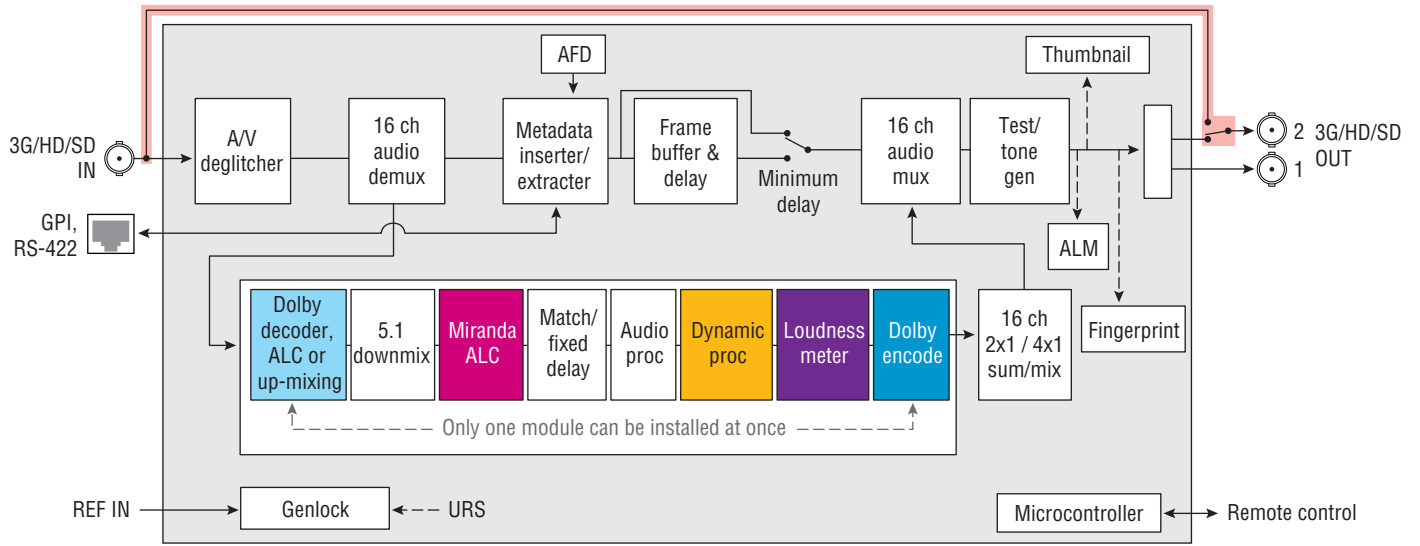
- > 3Gbps/HD/SD input
- > Supports 3Gbps level A (mapping 1) and level B
- > Audio/video deglitcher to handle video hot switch at the input
- > Automatic detection of input video loss and switchover to local grey for continuity of embedded audio
- > Flexible HD/SD/URS reference input
- > Minimum processing delay of 8  $\mu$ s, but additional delay can be added up to 15 frames
- > Miranda test tone inserter for out of service lip sync measurement
- > Bypass relay on rear module
- > Compatible with iControl end-to-end A/V fingerprint analyzer for lip sync error detection and measurement

#### Metadata

- > AFD (SMPTE-2016), VLI (RP-186) and WSS insertion
- > Dolby Metadata insertion and extraction (SMPTE 2020)
- > RS-422 serial data input & output to carry audio metadata
- > GPI inputs & outputs that can be inserted or extracted in the Time Code user bits. They can also be used for automation and user preset recall

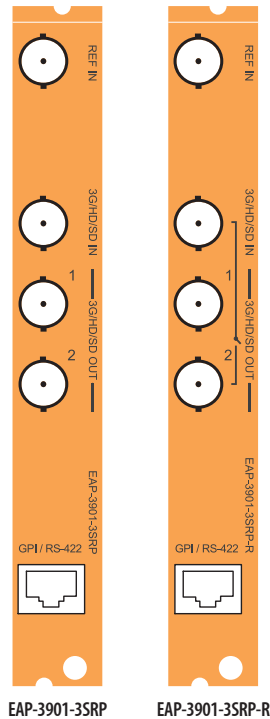
#### Audio

- > Full audio shuffling and mixing on a channel basis
- > 32 channels internal audio processing
- > Audio 5.1 surround down-mix to Lt/Rt or Lo/Ro
- > On-board ALC option
- > Audio dynamic processor option (compressor/limiter/expander)
- > Audio loudness meter option (LEQ(A) or ITU-R BS.1770)
- > Audio delay adjustments of up to 2 seconds to compensate for lip sync issues
- > Optional Dolby E / Dolby Digital encoder and decoder modules
- > Optional upmix module using Linear Acoustic upMAX™
- > Optional ALC module using Linear Acoustic AEROMAX™
- > Optional ALC module using Jünger Audio Level Magic™



EAP-3901 Functional Block Diagram

| Options (hardware & software)                                       |   |   |  |
|---|---|---|--|
| <span style="color: red;">■</span> with EAP-3901-3SRP-R rear module | <span style="color: yellow;">■</span> EAP-3901-OPT-DP   | <span style="color: lightblue;">■</span> MOD-LA-ALC     | <span style="color: blue;">■</span> MOD-DOLBY-ENG-E      |
|   | <span style="color: purple;">■</span> EAP-3901-OPT-LM   | <span style="color: lightblue;">■</span> MOD-JA-ALC     | <span style="color: blue;">■</span> MOD-DOLBY-ENG-D      |
|   | <span style="color: magenta;">■</span> EAP-3901-OPT-ALC | <span style="color: lightblue;">■</span> MOD-LA-DUP-701 | <span style="color: lightblue;">■</span> MOD-DOLBY-DEC-2 |



## TECHNICAL SPECIFICATIONS

### VIDEO INPUT/OUTPUT

Signal (1): SMPTE-259M-C (270 Mbps),  
SMPTE-292M (1.485, 1.485/1.001Gbps),  
SMPTE-424M (2.970, 2.970/1.001Gbps)

Supported formats: SD: 480i59.94, 576i50  
HD: SMPTE-274M: 1080i59.94, 1080i50  
HD: SMPTE-296M: 720p59.94, 720p50  
3Gbps: SMPTE-425M level A (mapping 1),  
level B: 1080p59.94, 1080p50

Cable length \*: 300 m Belden 1694A at 270 Mbps  
150 m Belden 1694A at 1.485Gbps  
120 m Belden 1694A at 2.970Gbps

Return loss \*: >15 dB up to 3 GHz

Jitter: HD/SD: <0.2 UI  
3Gbps: <0.3 UI

### REFERENCE INPUT

Signal: SMPTE 170M/SMPTE 318M/ITU 624-4  
black burst  
SMPTE 274M / SMPTE 296M tri-level  
Sync

Return loss: >35 dB up to 5.75 MHz

### GPIO

Signal (3): Contact closure to ground  
Connector: RJ-45  
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 µs (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 2 s (1 ms steps)

### ELECTRICAL

Power: 12.5 W

\* Cable length and return loss specifications will be reduced when using the EAP-3901-3SRP-R rear connector



## ORDERING INFORMATION

### Densité 3 frame

| Description     | Description                                     |
|-----------------|---|
| EAP-3901        | 3Gbps/HD/SD embedded audio & Metadata processor |
| EAP-3901-3SRP   | Single rear connector panel                     |
| EAP-3901-3SRP-R | Single rear connector panel with bypass relay   |

### Options (software)

| Description         | Description                               |
|---------------------|---|
| EAP-3901-OPT-DP     | Dynamic audio processing option           |
| EAP-3901-OPT-LM     | Loudness meter option                     |
| EAP-3901-OPT-ALC-2  | 2-channel on-board ALC option by Miranda  |
| EAP-3901-OPT-ALC-6  | 6-channel on-board ALC option by Miranda  |
| EAP-3901-OPT-ALC-8  | 8-channel on-board ALC option by Miranda  |
| EAP-3901-OPT-ALC-16 | 16-channel on-board ALC option by Miranda |

### Options (hardware)

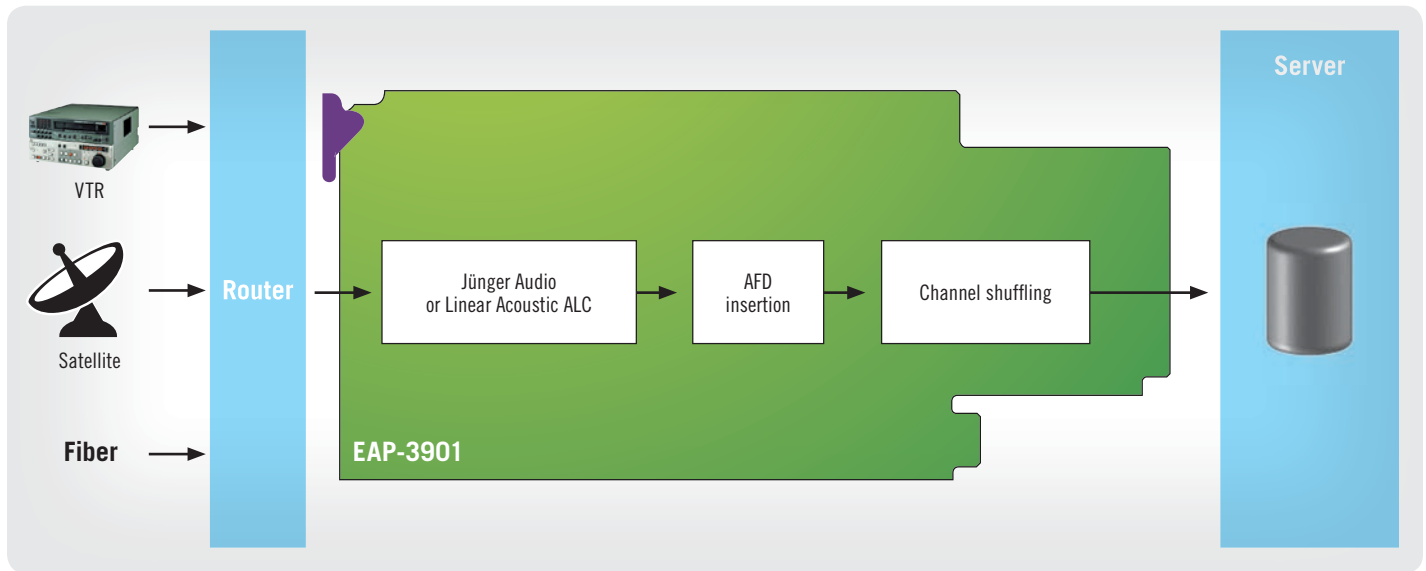
| Description      | Description   |
|------------------|---|
| MOD-DOLBY-ENC-E  | Dolby E encoder   |
| MOD-DOLBY-ENC-D  | Dolby digital (AC-3) encoder  |
| MOD-DOLBY-DEC-2  | Dolby E & digital (AC-3) decoder                                    |
| MOD-LA-DUP-701   | Upmixing using Linear Acoustic Technology upMAX™                    |
| MOD-LA-ALC-2     | 2-channel ALC licensed by Linear Acoustic                           |
| MOD-LA-ALC-6     | 6-channel ALC licensed by Linear Acoustic                           |
| MOD-LA-ALC-8     | 8-channel ALC licensed by Linear Acoustic                           |
| MOD-LA-ALC-2-DUP | 2-channel ALC and upmix licensed by Linear Acoustic                 |
| MOD-LA-ALC-6-DUP | 6-channel ALC and upmix licensed by Linear Acoustic                 |
| MOD-LA-ALC-8-DUP | 8-channel ALC and upmix licensed by Linear Acoustic                 |
| MOD-JA-ALC-2     | 2-channel ALC licensed by Jünger Audio                              |
| MOD-JA-ALC-6     | 6-channel ALC licensed by Jünger Audio                              |
| MOD-JA-ALC-8     | 8-channel ALC licensed by Jünger Audio                              |
| MOD-JA-ALC-2-DUP | 2-channel ALC licensed by Jünger Audio and upmix by Linear Acoustic |
| MOD-JA-ALC-6-DUP | 6-channel ALC licensed by Jünger Audio and upmix by Linear Acoustic |
| MOD-JA-ALC-8-DUP | 8-channel ALC licensed by Jünger Audio and upmix by Linear Acoustic |

### Remote Control

iControl, iControl Solo, RCP-200

# EAP-3901: Typical audio processing applications

## Ingest with ALC, AFD and channel mapping



## Playout with ALC and Dolby Digital (AC-3) encoding

