The CE-xA/A encoder module unleashes the power of MPEG-4 AVC Fidelity Range Extensions (FRExt), enabling broadcasters and operators to capture, archive and distribute content in the best possible quality HDTV.

The CE-xA/A encoder module is built on the most flexible and future-proof platform available on the market, capable of encoding MPEG-4 AVC HD 4:2:2 with 10-bit precision. It provides a uniquely modular software upgradeable solution that allows customers to exploit the advantages of MPEG-4 AVC compression in Contribution and Primary Distribution (C&D) applications, while maintaining compatibility with the existing generation of MPEG-2 Video based networks.

The flexibility and outstanding portability of the AVP solution enables customers to dimension their networks for the exact needs of today, while taking into consideration the natural expansion of tomorrow, effectively minimizing the overall total cost of ownership and maximizing the true value of the media assets. For example, 2D connections based on MPEG-2 Video compression today can be upgraded in-field easily to 3D MPEG-4 AVC HD 4:2:2 10-bit contribution links, even on an event basis. An integral part of the MediaKind MPEG-4 AVC HD 4:2:2 system solution, the CE-xA/A encoder module effectively enables the full-scale migration to MPEG-4 AVC all-HD in C&D.
Product Overview
Cutting edge Innovation Delivers the Most Flexible Contribution Encoder

Based on two decades of encoder design experience, the CE-xA/A option module is a radical new design. Based on MediaKind’s in-house technology, the CE-xA/A targets the algorithmic implementation for C&D applications in a flexible and future-proof platform, providing bandwidth efficiencies typical of Direct To Consumer applications and effectively enabling a mass migration to the more bandwidth efficient MPEG-4 AVC standard.

Multi-channel and Multi-codec
The ability to position multiple multi-codec encoder modules within a single chassis allows customers to target the widest variety of applications, from dense distribution and legacy MPEG-2 Video contribution to the highest-quality MPEG-4 AVC HD 4:2:2 10-bit.

Efficient Use of Spectrum
The CE-xA/A option module delivers outstanding compression efficiency:

- 30 percent or more bandwidth savings compared to MPEG-2 Video at contribution rates
- Support for higher end features such as 4:2:2 sampling and 10-bit resolution via simple software/firmware upgrades

Hot Swappable Support
The CE-xA/A encoder module is hot swappable to allow on-site servicing, unit re-purposing and maximum portability.

Software Upgradeability
The CE-xA/A encoder module is based on the same future-proof, software-upgradeable platform as the AVP platform This enables support for features such as 10-bit, 3D and future features such as 1080p 50/59.94 to be added via a simple Value Pack upgrades at no additional hardware expense.

Option Module Features
CE-xA/A Encoder Module (CE/HWO/CE-xA/A)

- Two slots per module. Up to two modules per chassis depending on configuration
- 3G/HD/SD-SDI, video input
- MPEG-4 AVC HD/SD 4:2:2/4:2:0 encoding (up to High 422 Profile at Level 4.1)*
- MPEG-4 AVC 10-bit precision support*
- MPEG-2 Video HD/SD 4:2:2/4:2:0 encoding (up to MP@HL)*
- Part of 3D contribution system with MediaKind RX8200 and Simulsync 3D technology*
- 1 Mbps to 80 Mbps video bit-rate*
- Multiple low latency modes
- Embedded SDI audio input
- MPEG-1 Layer II Audio encoding
- Dolby® Digital 5.1, Dolby®E and Linear PCM pass-through
- iRDO™ HD algorithm implementation
- Generic VANC extraction and carriage (SMPTE 2038)
- Test pattern and test tone generators
- Software upgradeable
- Hot swappable
- AES-EBU balanced and un-balanced connections
- Analog CVBS input NTSC and PAL (PAL-M not supported)
- Analog audio input

*Exact capabilities depend on Value Pack selection

Supported Modules
The CE-xA/A encoder module is purposely built on a single, powerful, software upgradeable platform. This dedicated hardware allows the encoder to be configured exactly for the needs of any network, while maintaining the portability, the re-purposing capabilities and the easy upgrade path required by today’s flexible contribution and distribution operations.

Capable of operating across a broad operating range, the encoder will provide the best format for the growing telco infrastructures, while exploiting the compression gains of MPEG-4 AVC in bandwidth-limited contribution and distribution networks. The ability to use multiple modules within a single chassis further extends the flexibility and density of the solution.

The following table lists the profiles and capabilities, feature set is decided by adding Value Packs to the base card. Additional Value Packs can be added at any time.
Value Packs

SD Value Pack (CE/SWO/VP/x/SD)
- MPEG-2 SD encode
- MPEG-4 SD encode
- 2 x 2.0 MPEG-1 LayerII audio encode
- Splice point conditioning
- Motion Compensated Temporal Filtering

HD Value Pack (CE/SWO/VP/x/HD)
- MPEG-2 SD encode
- MPEG-4 SD encode
- MPEG-2 HD encode
- MPEG-4 HD encode
- 4 x 2.0 MPEG-1 LayerI encode
- Splice point conditioning
- Motion Compensated Temporal Filtering

Contribution Value Pack (CE/SWO/VP/x/CONT)
- 4:2:2 10-Bit precision encode

Advanced Contribution Value Pack (CE/SWO/VP/x/CONT/ADV)
- 1080p 50/59.94 encode
- 3-D simsync
- Stripe refresh

Advanced Audio Coding (CE/SWO/AAC)
- Enables one pair of Advanced Audio Coding (AAC-LC, HE-AAC, HE-AACv2) stereo audio encoding
- Up to six independent pairs per encoder module can be supported

Phased Aligned Audio (Patent Pending) (CE/SWO/PAA)
- MediaKind Phase Aligned Audio algorithm for 5.1 and 7.1 audio carriage in contribution and distribution networks
- Requires at least three pairs of MPEG-1 Layer II audio encoding enabled
- NOTE: For PAA use on SD, the upstream embedder must provide the DID’s on the same video line and in a fixed sequence.

Audio Contribution Value Pack (CE/SWO/VP/CONT/AUDIO)
- Phase Aligned Audio (PAA)
- 2 x 2.0 MPEG-1 LayerII audio encode
- Supported Modules

Dolby Digital Audio Value Pack (CE/SWO/VP/DOLBY/AC3)
- 1 x 2.0 Dolby Digital audio encode
- 3 licenses required for 5.1 encoding
- 3 instances required for 5.1

AAC Audio Value Pack (CE/SWO/VP/AAC, 101 0196/256)
- 1 x 2.0 AAC audio encode
- 3 instances required for 5.1

MPEG-1 LayerII Audio Value Pack (CE/SWO/VP/M1L2, 101 0196/255)
- 1 x 2.0 MPEG-1 Layer II audio encode

Additional MPEG-1 Layer II Encoding (CE/SWO/M1L2)
- Enables one pair of MPEG-1 Layer II Audio encoding
- Up to six additional pairs of audio per encoder module can be supported to make a total of eight pairs per module
- NOTE: 2 licenses are included as standard

Dolby® Digital Stereo Encoding (CE/SWO/DOLBY/AC3)
- Enables one pair of Dolby® Digital (AC-3) stereo audio encoding
- Up to six independent pairs per encoder module can be supported
**Specification**

**CE-xA/A Video and Audio Encoder Option Module**

| CE-xA/A Video and Audio Encoder Option Module | Two slots per module  
|                                             | One to two CE-xA/A option modules per chassis  
|                                             | Full support for module level hot swap |

**Input**

**Video**

- 3G/HD/SD-SDI serial digital video with EDH error detection and health monitoring  
- Analogue CVBS Input NTSC and PAL (PAL-M not supported)  
- HSYNC support for single PCR operation (separate hardware option for HSYNC input)  
- Input Level 800 mV ptp ±10 percent  
- Return loss >15 dB, 10 MHz to 270 MHz

**Audio**

- Up to eight stereo pairs embedded on HD-SDI  
- Up to four stereo pairs via AES EBU (Connector via D-Type to XLR)  
- Supports both balanced (AES3) and unbalanced (AES3id) digital audio inputs  
- 48 kHz sampling rate  
- 2 x Stereo Analogue Audio inputs

**Advanced Pre-processing**

**Advanced Pre-processing**

- Clarus™ professional grade adaptive spatial and temporal noise reduction, offering four adaptive levels (option)  
- Frame re-synchronization  
- Scene cut detection and I-frame insertion  
- Still detection

**Video Encoder**

**Video Encoder**

- MPEG-4 AVC Main Profile @ Level 4.0 (1 Mbps to 20 Mbps) (CE/SWO/VP/x/SD or CE/SWO/VP/x/HD)  
- MPEG-4 AVC High Profile @ Level 4.0 (1 Mbps to 25 Mbps) (CE/SWO/VP/x/HD)  
- MPEG-4 AVC 4:2:2 Profile @ Level 4.1 (1 Mbps to 80 Mbps) (CE/SWO/VP/x/HD) + (CE/SWO/VP/x/CONT)  
- MPEG-2 Video Main Profile @ Main Level  
- MPEG-2 Video Main Profile @ High Level (CE/SWO/VP/x/HD)  
- 1 Mbps to 80 Mbps bit-rate range (depends on profile/level supported)  
- CABAC entropy encoding up to 62.5 Mbps  
- Manual CABAC switching-point override  
- Triple pass “Pixel Perfect” fully exhaustive motion estimation  
- Multiple low latency modes supporting delays down to 350ms* end-to-end delay (when used in conjunction with a RX8200 receiver.) *Configuration dependent.  
- CBR and Low Delay modes  
- GOP processing includes adaptive GOP structure and adaptive GOP length
## Video Resolutions

<table>
<thead>
<tr>
<th>Resolutions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920, 1440 x 1080i 25</td>
<td>Only with CE/SWO/VP/x/HD</td>
</tr>
<tr>
<td>1920, 1440 x 1080i 29.97</td>
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<tr>
<td>1280, 960 x 720p 50</td>
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<tr>
<td>1280, 960 x 720p 59.94</td>
<td>Only with CE/SWO/VP/x/CONT/ADV</td>
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<td>1920 x 1080p 50</td>
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</tr>
<tr>
<td>1920 x 1080p 59.94</td>
<td></td>
</tr>
<tr>
<td>720, 704, 640, 544, 528, 480, 352 x 576i 25</td>
<td>Only with CE/SWO/VP/x/SD or CE/SWO/VP/x/HD Value Pack</td>
</tr>
<tr>
<td>720, 704, 640, 544, 528, 480, 352 x 480i 29.97</td>
<td></td>
</tr>
</tbody>
</table>

## Audio Encoder

### Audio Encoder

- Up to 8 x stereo audio channel processing

### MPEG-1 Layer II encoding standard

- Encoding rates from 32 kbps to 384 kbps - up to 8 pairs

### Dolby® Digital (AC-3)

- Encoding rates from 56 kbps to 640 kbps (option) - maximum of 6 pairs
- Pass-through of pre-encoded Dolby Digital, up to 8 streams

### Advanced Audio Coding (AAC)

- Encoding of AAC-LC (64 kbps to 320 kbps), HE-AAC (48 kbps to 128 kbps), HE-AACv2 (32 kbps) - up to 6 pairs

### Dolby®E pass-through

- Up to four streams

### Linear PCM pass-through

- Up to four independent stereo pairs

### Phased Aligned Audio (PAA)

- Encoding of 6 or 8 audio channels with time synchronous samples.

## Ancillary Data

### Ancillary Data

- SMPTE 334-1 Closed Captions
- SMPTE 2016-3 AFD and Bar Data
- SMPTE 12-2 Time code extraction and carriage (ETSI TS101 154)
- SMPTE 2038 Generic VANC data extraction, up to 2 Mbps

## Features

### Features

- Internal test tone and test pattern generation
- Auto switching on loss of input source to test pattern, last good video frame with selectable text message
- Optional PID elimination on loss of input

## Physical and Power

### Approximate Weight

- 0.66 kg (1.5 lbs) per CE-xA/A option module

### Power Consumption per module

- Less than 110 Watts

## Environmental Conditions

### Operating Temperature

- -10°C to 50°C (14°F to 122°F)

### Operating Humidity

- < 95% non-condensing