

# ERICSSON CE-x OPTION MODULE



The CE-x/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-x/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. The encoder module provide a uniquely modular software upgradeable solution that allows customers to exploit the advantages of MPEG-4 AVC compression in contribution and distribution (C&D) applications, while maintaining compatibility with the existing generation of MPEG-2 Video based networks.

The flexibility and amazing portability of the AVP solution allows 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 Ericsson MPEG-4 AVC HD 4:2:2 system solution, the CE-x/A encoder module effectively enables the full-scale migration to MPEG-4 AVC all-HD in C&D.

## PRODUCT OVERVIEW

### Outstanding Innovation Delivers the Most Flexible Contribution Encoder

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

### Multi-channel and Multi-codec

The ability to fit 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 and 3D contribution.

### Efficient Use of Spectrum

The CE-x/A option module delivers compression efficiency that allows:

- 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-x/A encoder module is hot swappable to allow on-site servicing, unit re-purposing and maximum portability.

### Software Upgradeability

The CE-x/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-x/A Encoder Module

(CE/HWO/CE-x/A, FAZ 101 0196/xxx)

- 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 Ericsson 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

*Exact capabilities depend on Value Pack selection*

## SUPPORTED MODULES

The CE-x/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, FAZ 101 0196/268)

Provides capability for:-

- *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, FAZ 101 0196/269)

Provides capability for:-

- *MPEG-2 SD encode*
- *MPEG-4 SD encode*
- *MPEG-2 HD encode*
- *MPEG-4 HD encode*
- *4 x 2.0 MPEG-1 LayerII encode*
- *Splice point conditioning*
- *Motion Compensated Temporal Filtering*

### Contribution Value Pack

(CE/SWO/VP/x/CONT, FAZ 101 0196/264)

Provides capability for:-

- *4:2:2 10-BIT precision encode*

### Advanced Contribution Value Pack

(CE/SWO/VP/x/CONT/ADV, FAZ 101 0196/265)

Provides capability for:-

- *1080p 50/59.94 encode*
- *3-D simsync*
- *Stripe refresh*

### Audio Contribution Value Pack

(CE/SWO/VP/CONT/AUDIO, FAZ 101 0196/254)

Provides capability for:-

- *Phase Aligned Audio (PAA)*
- *2 x 2.0 MPEG-1 LayerII audio encode*

### Dolby Digital Audio Value Pack

(CE/SWO/VP/DOLBY/AC3, FAZ 101 0196/257)

Provides capability for:-

- *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, FAZ 101 0196/256)

Provides capability for:-

- *1 x 2.0 AAC audio encode*

3 instances required for 5.1

### MPEG-1 LayerII Audio Value Pack

(CE/SWO/VP/M1L2, FAZ 101 0196/255)

Provides capability for:-

- *1 x 2.0 MPEG-1 LayerII audio encode*

## SPECIFICATIONS

### CE-x/A Video and Audio Encoder Option Module

Two slots per module  
 One to two CE-x/A option modules per chassis  
 Full support for module level hot swap

#### Inputs

##### Video

3G/HD/SD-SDI serial digital video with EDH error detection and health monitoring  
 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

#### 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

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

Only with CE/SWO/VP/x/HD  
 1920, 1440 x 1080i 25  
 1920, 1440 x 1080i 29.97  
 1280, 960 x 720p 50  
 1280, 960 x 720p 59.94  
 Only with CE/SWO/VP/x/CONT/ADV  
 1920 x 1080p 50  
 1920 x 1080p 59.94  
 Only with CE/SWO/VP/x/SD or CE/SWO/VP/x/HD Value Pack  
 720, 704, 640, 544, 528, 480, 352 x 576i 25  
 720, 704, 640, 544, 528, 480, 352 x 480i 29.97

### 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

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

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-x/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