ERICSSON CE-X SERIES OPTION MODULES

The CE-x Series encoder modules unleash 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 series 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 modules 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 Series encoder modules effectively enable 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 Series option modules are a radical new design. Based on Ericsson's in-house technology, the CE-x Series 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 Series option modules deliver 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
All modules in the CE-x Series range are hot swappable to allow on-site servicing, unit re-purposing and maximum portability.

Software Upgradeability
All modules in the CE-x Series are based on the same future-proof, software-upgradeable 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 software upgrade and licensing scheme at no additional hardware expense.

OPTION MODULE FEATURES

CE-x Series Encoder
(CE/HWO/CE-x, FAZ 101 0196/10)

CE-x Series Encoder Licenses
(CE/HWO/CE-x/H264, FAZ 101 0196/16)
(CE/HWO/CE-x/HD, FAZ 101 0196/21)
(CE/HWO/CE-x/H422, FAZ 101 0196/17)
(includes 10-bit License for H.264)

- 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 High422 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
- Digital AES-EBU and 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

** Exact capabilities depend on module and licensing*

SUPPORTED MODULES

The CE-x Series 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 license to the base card. Additional licenses can be added at any time.

Resolution and Profile	Base Card	License CE/SWO/CE-x/422	License CE/SWO/CE-x/H264	License CE/SWO/CE-x/HD
SD and HD MPEG-2, H.264, 4:2:2, 10-bit	CE/HWO/CE-x	√	√	√
SD MPEG-2, H.264, 4:2:2, 10 bit	CE/HWO/CE-x	√	√	
SD and HD MPEG-2, 4:2:2, 10-bit	CE/HWO/CE-x	√		√
SD MPEG-2, 4:2:2, 10-bit	CE/HWO/CE-x	√		
SD and HD MPEG-2, H.264, 4:2:0, 8-bit	CE/HWO/CE-x		√	√
SD MPEG-2, H.264, 4:2:0, 8-bit	CE/HWO/CE-x		√	
SD and HD MPEG-2, 4:2:0, 8-bit	CE/HWO/CE-x			√
SD MPEG-2, 4:2:0, 8-bit	CE/HWO/CE-x			

SOFTWARE OPTIONS

Additional MPEG-1 Layer II Encoding

(CE/SWO/M1L2, FAZ 101 0119/11)

- 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, FAZ 101 0119/8)

- Enables one pair of Dolby® Digital (AC-3) stereo audio encoding
- Up to three independent pairs per encoder module can be supported

Advanced Audio Coding

(CE/SWO/AAC, FAZ 101 0119/47)

- 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, FAZ 101 0119/45)

- Ericsson's 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
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NOTE: For PAA use on SD, the upstream embedder must provide the DID's on the same video line and in a fixed sequence.

3D Contribution

(CE/SWO/3D, FAZ 101 0119/48)

- Ericsson unique solution for discreet Left + Right full-resolution contribution of 3D images at the highest quality HD MPEG-4 AVC 4:2:2 10-bit
- Requires two CE-x modules in a single AVP chassis
- Requires Simulsync 3D enabled RX8200 receivers

Motion Compensated Temporal Filtering

(CE/SWO/MCTF, FAZ 101 0119/44)

- Superior professional-grade noise reduction to address the most demanding noisy video sources while preserving high spatial resolution
- It is not suitable for low latency operation

DPI Splice Point

(CE/SWO/DPI, FAZ 101 0119/87)

- Digital program insertion splice point license
- Allows SCTE-35 stream splicing triggered from SCTE-104 in VANC
- Can also be triggered by GPI on GPI card
- Only suitable for CBR modes, does not function in low latency modes

Stripe Refresh License

(CE/SWO/CE-x/STRIPE, FAZ 101 0119/89)

- Provides sub 100mS latency for MPGE4 –AVC encoding

Please contact Ericsson or an approved reseller to confirm which combinations of options are supported.

SPECIFICATIONS

CE-x Video and Audio Encoder Option Module

Two slots per module

One to two CE-x 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/CE-x/H264)

MPEG-4 AVC High Profile @ Level 4.0
(1 Mbps to 25 Mbps) (CE/SWO/CE-x/264) + (CE/SWO/CE-x/HD

MPEG-4 AVC 4:2:2 Profile @ Level 4.1
(1 Mbps to 80 Mbps) (CE/SWO/CE-x/264) + (CE/SWO/CE-x/HD+(CE/SWO/CE-x/422)

MPEG-2 Video Main Profile @ Main Level

MPEG-2 Video Main Profile @ High Level (CE/SWO/CE-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 dependant.

CBR and Low Delay modes

GOP processing includes adaptive GOP structure and adaptive GOP length

Video Resolutions

Only with CE/SWO/CE-x/HD license
1920 x 1080i 25
1920 x 1080i 29.97
1280 x 720p 50
1280 x 720p 59.94

CE-x base card
720, 704, 640, 544, 528, 480, 352 x 576i 25
720, 704, 640, 544, 528, 480, 352 x 480i 29.97
352 x 288i 25
352 x 240i 29.97

Audio Encoder

Up to 8x 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 3 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 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

< 90% non-condensing