The compression performance of the Harmonic ViBE® EM4000 HD/SD encoder allows for significant cost savings through better use of bandwidth while delivering a premium viewing experience.

The ViBE encoder brand is synonymous with premium, high-quality video compression. Now part of Harmonic, ViBE encoders utilize the most advanced compression technologies available, gained from 20 years of know-how in encoder algorithm optimization. The ViBE EM4000 is especially well-suited for satellite, terrestrial broadcast and premium cable or IPTV applications, as well as various other kinds of content aggregation.

At the heart of the ViBE EM4000 is a decoupled processing engine driving the Mustang 2.0 next-generation compression algorithm. Mustang 2.0 increases HD MPEG-4 AVC encoding efficiency thanks to improved motion estimation, refined multi-pass encoding and advanced preprocessing.

**Picture Perfect Video Delivery**
The advanced ViBE EM4000 encoder sets a new benchmark in video and audio encoding. It delivers the highest compression performance in all formats — HD AVC, SD AVC, HD MPEG-2 and SD MPEG-2 — allowing users to broadcast more channels per multiplex. Broadcast-grade SD-to-HD up-conversion allows a full HD channel lineup offering; combined with premium HD AVC encoding, the ViBE EM4000 delivers better picture quality than SD MPEG-2 at the same bitrate. With encoding latency of just two seconds in CBR and three seconds in VBR from baseband input, the encoder is perfect for live broadcast applications.

When combined with the Flexstream 2.0 statistical multiplexing solution, the ViBE EM4000 further optimizes bandwidth usage by including non-video components in the statmux pool, and minimizes the number of encoders required for regionalization.

The audio encoding features of the ViBE EM4000 are equally impressive. With integrated Dolby Digital Plus (E-AC-3) 5.1 surround-sound encoding, it is possible to deliver audio that matches the high quality of the video. In addition to E-AC-3, the ViBE EM4000 features the latest AAC audio compression for ultra-low bandwidth utilization.

**Simplified & Evolving Headends**
Possessing advanced integrated features, the ViBE EM4000 helps reduce the headend footprint and simplify operations. The encoder provides up to eight HD channels per rack unit, including 16 multichannel (5.1) audio services and Dolby E to Dolby Digital (AC-3) transcoding. Baseband (SD/HD-SDI/3G-SDI) or compressed input (IP or ASI) are available to fit any architecture and provide highly secure redundancy schemes.

The ViBE EM4000 simplifies workflows with additional features such as Jünger Level Magic™ automatic loudness control, teletext-to-DVB subtitle transcoding using Cavena subtitling technology, broadcast-grade up/down-scaling and logo insertion. The encoder further helps users lower their OPEX via low power consumption of less than 65W per channel (eight-channel model) and front-to-back cooling. Dual power supplies add peace of mind.

**World-Class Service & Support**
Harmonic stands behind the ViBE EM4000 platform with comprehensive service and support programs, including system design, service deployment, technical support and network maintenance. World-class service plans and a global network of flexible and responsive support professionals help ensure your ability to deliver outstanding “anytime, anywhere, any-device” customer experiences.

### ViBE® EM4000
**PREMIUM HD/SD ENCODER**

- Superior SD/HD MPEG-4 AVC video encoding
- Advanced preprocessing, including motion-compensated filtering, even for compressed input
- SD/HD and MPEG-2/AVC change via software license
- Baseband and compressed input
- Up to eight HD channels per RU
- Dolby® Digital, Dolby Digital Plus and AAC/HE-AAC support
- Dolby E and SMPTE 2020 to HE-AAC 5.1 transcoding with metadata and auto switch out
- 3G capable input
- Harmonic Flexstream™ WAN, LAN and internal statistical multiplexing
- Embedded DVB subtitle generation
- Embedded automatic loudness control
- Broadcast-grade upscale/downscale
- Logo insertion
- DPI and targeted advertising support
- Dual power supply
ViBE EM4000 PREMIUM HD/SD ENCODER

**ViBE EM4000 DTT/DTH Workflow**

**SPECIFICATIONS**

**INPUT/OUTPUT**

**Inputs**
- SD-SDI (SMPTE 259M) and HD-SDI (SMPTE 292M) serial digital video, featuring frame synchronizer to cope with unclean input switching
- 3G-SDI ready (SMPTE 424M/372M)
- Dedicated ASI input for data such as DVB subtitling injection
- ASI and dual GbE for re-encoding applications
- Custom slide

**Outputs**
- MPTS and multi SPTS (IP streaming)
- Dual GbE interfaces
- FEC generation (SMPTE 2022-1) on IP streams

**VIDEO PROCESSING**

**Encoding Profiles**
- MPEG-2
- MPEG-4 AVC
- HP @ L3 and L4
- MP @ L3 and L4
- CBR, VBR, cVBR (seamless bitrate changes)

**Encoding Schemes**
- CBR, VBR, cVBR (seamless bitrate changes)

**Resolutions and Frame Rates**
- 480i @ 29.97 Hz
- 576i @ 25 Hz
- 720p @ 50 and 59.94 Hz
- 1080i @ 25 and 29.97 Hz
- 1080p @ 25 Hz

**Advanced Preprocessing**
- Pixel-based motion-compensated noise reduction
- 2D smart adaptive filtering for very low bitrate applications
- Cut, fade and flash detection
- Block artifact reduction
- Mosquito noise reduction

**Ancillary Data Processing**
- AFD
- HD teletext subtitling (OP-47 and SMPTE 2031)
- Closed captioning and extended data service
- VITC and D/VITC
- Teletext transcoding to DVB-subtitling
SPECIFICATIONS

AUDIO PROCESSING

Formats and Bitrates

- MPEG-1 Layer II: 32-192 kbps
- AC-3 2.0: 96-448 kbps
- AC-3 5.1: 384-640 kbps
- E-AC-3 5.1: 192-448 kbps
- AAC-LC/HE-AAC/HE-AACv2 2.0: 32-128 kbps
- AAC-LC/HE-AAC 5.1: 96-448 kbps

Processing Capabilities

- Dolby E to AC-3 transcoding
- Dolby E to E-AC-3 transcoding
- AC-3 or E-AC-3 pass-through with error masking
- AC-3 to E-AC-3 transcoding
- Dolby E to HE-AAC transcoding
- SMPTE 2020 support
- Jünger Level Magic automatic loudness control
- Radio encoding

CONTROL AND MONITORING

XMS network management system, including N+P redundancy
- Embedded web server
- SNMP agent
- Front panel

Insertion of digital cue tones (SCTE 35) from Ethernet (SCTE 104), SDI (SMPTE 2010) or compressed input

PHYSICAL

Rack Height: 1 RU x 19 in
Power Consumption: ≤ 460 W (for 8 channels)
Input Voltage: 100-240V AC
Cooling: Front to rear airflow
Features: Dual power supplies

ENVIRONMENTAL

Operating Temperature: 41° to 104° F (5° to 40° C)
Storage Temperature: 23° to 113° F (-10° to 70° C)
Maximum Humidity: 90%
Electromagnetic Compliance: CE marked in accordance with the 93/68/EEC (22/07/93) directive
EN 55022
EN 55024
EN 61000-3-2
Safety: IEC 60950 and EN 60950 UL 60950

ORDERING INFORMATION

HARDWARE ELEMENTS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM4000-1U-2AC-2CH</td>
<td>EM4000 platform with single PSU, IP output, capability for two HD channels</td>
</tr>
<tr>
<td>EM4000-1U-2AC-4CH</td>
<td>EM4000 platform with single PSU, IP output, capability for four HD channels</td>
</tr>
<tr>
<td>EM4000-1U-2AC-6CH</td>
<td>EM4000 platform with single PSU, IP output, capability for six HD channels</td>
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<tr>
<td>EM4000-1U-2AC-BCH</td>
<td>EM4000 platform with single PSU, IP output, capability for eight HD channels</td>
</tr>
<tr>
<td>EM4000-HW-2ASI-IN</td>
<td>ASI input connectors for auxiliary data</td>
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</tbody>
</table>

VIDEO SOFTWARE LICENSES

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM4000-LIC-MP4HD</td>
<td>One HD MPEG-4 AVC encoding channel</td>
</tr>
<tr>
<td>EM4000-LIC-MP2SD</td>
<td>One SD MPEG-2 encoding channel</td>
</tr>
<tr>
<td>EM4000-LIC-MP4SD</td>
<td>One SD MPEG-4 encoding channel</td>
</tr>
<tr>
<td>EM4000-LIC-MP2HD</td>
<td>One HD MPEG-2 encoding channel</td>
</tr>
<tr>
<td>EM4000-LIC-DEC-HD</td>
<td>One HD/SD MPEG-2/MPEG-4 AVC decoding channel</td>
</tr>
<tr>
<td>EM4000-LIC-PIP</td>
<td>Picture-in-picture operation</td>
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AUDIO SOFTWARE LICENSES

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>EM4000-LIC-MPEG1L2</td>
<td>MPEG-1 Layer II stereo</td>
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<tr>
<td>EM4000-LIC-DE</td>
<td>Dolby E decoding</td>
</tr>
<tr>
<td>EM4000-LIC-DDS1</td>
<td>AC-3 or E-AC-3 5.1 surround encoding</td>
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<tr>
<td>EM4000-LIC-DD20</td>
<td>AC-3 or E-AC-3 2.0 stereo encoding</td>
</tr>
<tr>
<td>EM4000-LIC-AAC</td>
<td>AAC/HE-AAC 2.0 stereo encoding</td>
</tr>
<tr>
<td>EM4000-LIC-DEC-DD51</td>
<td>AC-3 or E-AC-3 2.0/5.1 stereo/surround decoding</td>
</tr>
<tr>
<td>EM4000-LIC-HEAAC51</td>
<td>AAC/HE-AAC 5.1 surround encoding</td>
</tr>
<tr>
<td>EM4000-LIC-DDtoDD+</td>
<td>AC-3 to E-AC-3 transcoding</td>
</tr>
</tbody>
</table>

FEATURE SOFTWARE LICENSES

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM4000-LIC-FLXREM</td>
<td>Flextream statistical multiplexing</td>
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<tr>
<td>EM4000-LIC-FLXSZ</td>
<td>Allows non-video components into statistical multiplexing pool</td>
</tr>
<tr>
<td>EM4000-LIC-DVBSUB</td>
<td>DVB subtitling transcoder</td>
</tr>
<tr>
<td>EM4000-LIC-JUNG</td>
<td>Jünger Level Magic automatic loudness control</td>
</tr>
<tr>
<td>EM4000-LIC-FEC</td>
<td>FEC SMPTE 2022-I generation</td>
</tr>
<tr>
<td>EM4000-LIC-SD-UPSCALE</td>
<td>SD to HD up-conversion</td>
</tr>
<tr>
<td>EM4000-LIC-LOGO</td>
<td>Logo insertion</td>
</tr>
<tr>
<td>EM4000-LIC-TARGETED-AD</td>
<td>Targeted advertising support</td>
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