

### HIGHLIGHTS

- Multi-codec support options: capable of MPEG-2 or AVC encoding of SD or HD video
- High quality ultra-low bit-rate encoding with Hierarchical LookAhead™ and pre-processing
- Common hardware - License options as needed
- Up to 4 channels per chassis (1-RU)
- Optional dual independently compressed output per input
- Built-in broadcast quality up/down-converter
- High quality integrated decoding with FLEX™ technology option
- Statmux over IP in LAN and WAN environments with DiviTrackIP™
- Integrated statmux with DiviTrackMX™
- 3DTV Frame Compatible Format capable
- Microsoft Mediaroom Certified
- MPEG-2 45 Mbps HD option



With over 15,000 channels shipped the Electra® 8200 is a market leading single rack-unit (1-RU) encoder with multi-resolution, multi-standard, multi-service and multi-channel capabilities. The high performance Electra 8200 significantly enhances bandwidth efficiency and provides up to four standard definition (SD) or high definition (HD) channels of superior quality constant bit-rate (CBR) or variable bit-rate (VBR) video using either MPEG-2 or AVC encoding. The Electra 8200 adds a second encoding path on each channel that allows two independent compressed outputs from the same source. Its groundbreaking architecture and unrivalled feature has been proven to meet operational requirements of density and power efficiency, and facilitate the launch of new value-added video services.

Leveraging Harmonic's expertise and market leadership, the Electra 8200 has proven itself as the most advanced encoding platform for Cable, Satellite, IPTV or Terrestrial applications available today.

The platform has been widely deployed for all MPEG-2 and AVC applications and compression platforms. The Electra 8200 has enabled deployment of new services such as HD, and increases ROI on existing bandwidth. The flexible hardware platform can easily be reconfigured with a firmware upgrade, for new applications such as migrating from SD to HD.



## BUSINESS BENEFITS OF THE ELECTRA 8200

- **Expanded HD lineup** – Featuring an integrated broadcast quality upconverter, the Electra 8200 is ideally suited for a new range of applications such as HD simulcast of the existing premium SD channel lineup.
- **SD MPEG-2 business continuity** – The growing trend towards producing and distributing content exclusively in HD creates business continuity issues with legacy SD MPEG-2 set top boxes. The Electra 8200 can simultaneously generate both an SD MPEG-2 and an HD AVC output from a single HD input.
- **4:1 HD MPEG-2 for Cable** – The Electra 8200 can encode up to 4 statistically multiplexed HD MPEG-2 services within a single chassis, from HD-SDI, IP or ASI inputs. While delivering video compression performance exceeding previous solutions, this solution also offers native support for reception of AVC compressed content.
- **Increased channel capacity for Satellite** – Thanks to new compression gains, the Electra 8200 is designed to reclaim bandwidth by increasing the channel count per transponder. Its wide range of hardware and software options covers local and remote site scenarios with an emphasis on agility and quality of service.
- **Better quality and increased reach for IPTV** – Designed to deliver broadcast quality HDTV under 5 Mbps, the Electra 8200 increases eligibility for HD. Its native support for dual bit rate output further increases reach while offering watch and record capabilities over xDSL networks.
- **ATSC “Station-in-a-Box”** – the Electra 8200 is the perfect solution for ATSC stations looking to enhance subscriber experience and increase ad revenue by enabling new services at a lower cost. A standalone unit can encode and statistically multiplex up to 4 SD and/or HD services, and remultiplex external PSIP tables, resulting in a full ATSC multiplex.

## TECHNICAL BENEFITS OF THE ELECTRA 8200

- **Compression performance** – Engineered around a unique multi-pass architecture and based on the latest silicon (ASIC) and programmable (DSP/FPGA) technologies, the Electra 8200 offers unequalled gains in video compression efficiency over currently available products.
- **Leverages the Electra platform’s rich feature set** – The Electra 8200 inherits all the platform level features and options introduced on prior Electra generations, including: IP or ASI outputs, support for multiple audio processing adapters, support for Digital Program Insertion (DPI), and the FLEX® integrated decoder with IP, 8-VSB or ASI inputs.
- **Next generation IP-based statistical multiplexing** – The Electra 8200 enhances the efficiency and flexibility of statistical multiplexing with DiviTrackIP™ either in LAN or distributed WAN environments. The Electra 8200 can support up to 300ms of WAN round trip delay, auto-adjust to the IP network variations and form pools with up to 64 channels per pool.
- **Integrated statistical multiplexing** – The Electra 8200 streamlines system architectures by enabling “statmux-in-a-box” with Harmonic’s DiviTrackMX™.
- **Integrated high quality second resolution output** – The Electra 8200 redefines the delivery of multiple resolution channels from the same video input— from low resolution small picture formats, all the way to full HD for SDV or or time-shifted TV. The secondary channel offers to support a myriad of hybrid applications.
- **Built-in broadcast quality up/down converter** – The Electra 8200 makes the launch of differentiated services — such as an all-HD broadcast of the SD lineup — simple and cost effective.
- **Enhanced pre-processing** – The Electra 8200 offers advanced integrated noise reduction capabilities, including Harmonic’s signature Motion Compensated Temporal Filtering (MCTF). It also includes an adaptive deblocking and mosquito noise reduction filter designed to attenuate the compression artifacts that may be present in the video source and a sharpening filter to enhance the look of incoming source material.
- **Expanded audio tool set** – With “on-board” audio processing, each Electra 8200 video compression card can natively encode up to 3 stereo pairs (or a single multi-channel encode) from baseband audio embedded in the video. In addition, the Electra 8200 also supports a variety of optional audio adapters designed to address a variety of audio processing scenarios such as transcoding from Dolby® E sources.
- **Friendly management** – The Electra 8200 can be simply configured through a standalone web interface or with Harmonic’s NMX Digital Service Manager™ for mass configuring, monitoring and automated redundancy in centralized or distributed architectures.



## VIDEO SPECIFICATIONS

| Video Compression and bit rate (CBR/VBR) 4:2:0 encoding options |                                       |
|---|---------------------------------------|
| MPEG-2 MP@ML  | 1 to 15Mbps                           |
| MPEG-2 MP@HL  | 2 to 24 Mbps                          |
| MPEG-2 MP@HL  | 24 Mbps to 45 Mbps (Option: 29.97 Hz) |
| MPEG-4 AVC MP@L3  | 0.3 to 8 Mbps                         |
| MPEG-4 AVC HP@L4  | 1 to 20 Mbps                          |

| Video Processing   |  |
|--|--|
| LookAhead multi-pass processing  |  |
| Scene-cut and fade/dissolves detection                                 |  |
| Dynamic GOP management with adaptive I picture and B picture placement |  |
| Automatic input format (1080i or 720P) detection and switching         |  |

| Video Input Filtering                     |  |
|---|--|
| Motion compensated temporal filter (MCTF) |  |
| Horizontal filter                         |  |
| Mosquito noise reduction                  |  |
| Input deblocking                          |  |
| Sharpening                                |  |

|               |                                     |
|---------------|-------------------------------------|
| Aspect Ratios | 4:3 and 16:9<br>AFD and WSS control |
|---------------|-------------------------------------|

| SD Resolutions and frame rate                                 |  |
|---|--|
| 576i@25, 480i@29.97 x 720, 704, 640, 544, 528,480, 352 pixels |  |

| HD Resolutions and frame rate                                    |  |
|--|--|
| 720P @50 and 59.94, x 1280 and 960 pixels                        |  |
| 1080i @25 and 29.97, 1080PsF24, x1920, 1440, 1280 and 960 pixels |  |

|                             |  |
|-----------------------------|--|
| Ancillary Resolution Option | 96x96, 128x96, 192x192 (AVC MP@L1.3)   |
| Closed Captioning           | CEA 608 from Line 21<br>CEA 708 VANC extraction per SMPTE 334M<br>CEA 708 external caption server per SMPTE 333M |

|                                |                       |
|--------------------------------|-----------------------|
| Range of legacy support option | 608 to 708 conversion |
|--------------------------------|-----------------------|

|                        |  |
|------------------------|--|
| Ancillary data and VBI | Digitized waveform or VANC extraction per SMPTE 2031<br>AFD and Bar, VITC, AMOL, TV Guide, WST (Teletext), Inverted WST, WSS, VPS, PSIP Spooling |
|------------------------|--|

|                           |   |
|---------------------------|---|
| Digital Program Insertion | SCTE35 insertion via SCTE104 or VANC DPI triggers |
|---------------------------|---|

| Up/Down/Cross Conversion  |  |
|---|--|
| Conversion between 480i29.97, 720P59.94, and 1080i29.97                 |  |
| Conversion between 576i25, 720p50, and 1080i25                          |  |
| Conversion between 720P59.94 and 1080i29.97 or 1080i29.97 and 720P59.94 |  |

## AUDIO SPECIFICATIONS

|                        |   |
|------------------------|---|
| Standard Channels      | Up to 3 stereo pairs or one 5.1 multichannel per video service  |
| Audio Formats          | MPEG-1 Layer II, Dolby Digital (AC-3, 2.0), AAC, HE AAC (v1 and v2) native encoding, AC-3 (2.0 and 5.1) and AAC/HE AAC (2.0 and 5.1) pass-through |
| Operating Modes        | Mono, stereo  |
| Encoding Bit-Rate      |   |
| MPEG Audio Layer II    | 56 to 384 kbps  |
| Dolby Digital (AC-3)   | 56 to 448 kbps  |
| AAC                    | 32 to 384 kbps  |
| HE AAC                 | 32 to 128 kbps  |
| Sampling Frequencies   | 32 kHz, 44.1 kHz, 48 kHz  |
| Optional Audio Modules | See Electra 8000 Audio data sheet   |

## INPUTS AND OUTPUTS

|                                |  |
|--------------------------------|--|
| Video Inputs                   | Up to 4 Serial Digital inputs capable per SMPTE 259M (SD-SDI) or SMPTE 292M (HD-SDI) |
| Default Audio Inputs           | Embedded audio; up to 3 stereo pairs or one multi-channel per video service          |
| Transport Outputs              | MPEG-2 Transport Stream over UDP/IP (redundant 100/1000 BaseT connectors)            |
| Transport Stream Output Option | ASI  |
| Transport Stream Input Options | 8VSB<br>AVC over ASI or GbE<br>MPEG-2 over ASI or Gbe                                |

## SYSTEM MANAGEMENT

|                               |
|-------------------------------|
| NMX Digital Service Manager™  |
| Standalone web user interface |

## POWER

|                     |   |
|---------------------|---|
| Input Voltage Range | 85-132 VAC or 170-264 VAC<br>42-60 VDC  |
| Line Frequency      | 47-63 Hz  |
| Input Power         | Single source AB power switch for power diversity   |
| Typical Consumption | 110 W for ELC-8210 (1 channel)<br>160 W for ELC-8220 (2 channels)<br>210 W for ELC-8230 (3 channels)<br>260 W for ELC-8240 (4 channels) |



## ENVIRONMENTAL

|                            |  |
|----------------------------|--|
| Cooling                    | 9 fans; air flow front to side                                     |
| Operating Temperature      | +32° to +122° F<br>0° to +50° C                                    |
| Storage Temperature        | -4° to +176° F<br>-20° to +80° C                                   |
| Operating Humidity         | < 95% non-condensing   |
| Electromagnetic Compliance | FCC Part 15 Class A CE Mark (EN 55022 Class A and EN 50082-1:1997) |
| Safety                     | UL 1950 and cUL C22.2#950 EN 60950<br>ROHS Directive 2002/95/EC    |

## PHYSICAL

|                        |   |
|------------------------|---|
| Dimensions (W x H x D) | 19" x 1.75" x 24" (1-RU)<br>48.26 cm x 4.45 cm x 60.69 cm |
| Weight                 | 24 lbs. / 11 kg   |

## ELECTRA 8200 HARDWARE OPTIONS

| Model Number   | Description   |
|----------------|---|
| ELC-8210-HW-AC | Electra 8200 one-channel SD or HD MPEG2/AVC Encoder hardware platform. 1RU rack mountable chassis. AC power supply.   |
| ELC-8210-HW-DC | Electra 8200 one-channel SD or HD MPEG2/AVC Encoder hardware platform. 1RU rack mountable chassis. DC power supply.   |
| ELC-8220-HW-AC | Electra 8200 two-channel SD or HD MPEG2/AVC Encoder hardware platform. 1RU rack mountable chassis. AC power supply.   |
| ELC-8220-HW-DC | Electra 8200 two-channel SD or HD MPEG2/AVC Encoder hardware platform. 1RU rack mountable chassis. DC power supply.   |
| ELC-8230-HW-AC | Electra 8200 three-channel SD or HD MPEG2/AVC Encoder hardware platform. 1RU rack mountable chassis. AC power supply. |
| ELC-8230-HW-DC | Electra 8200 three-channel SD or HD MPEG2/AVC Encoder hardware platform. 1RU rack mountable chassis. DC power supply. |
| ELC-8240-HW-AC | Electra 8200 four-channel SD or HD MPEG2/AVC Encoder hardware platform. 1RU rack mountable chassis. AC power supply.  |
| ELC-8240-HW-DC | Electra 8200 four-channel SD or HD MPEG2/AVC Encoder hardware platform. 1RU rack mountable chassis. DC power supply.  |

## ELECTRA 8200 FIRMWARE OPTIONS

| License                     | License to Enable Function   |
|-----------------------------|--|
| FW-ELC-8K-HD-AVC            | Firmware option enabling output of one MPEG-4 AVC channel in HD 1080i or 720p format. This option also enables output in MPEG-4 AVC SD format.   |
| FW-ELC-8K-SD-AVC            | Firmware option enabling output of one MPEG-4 AVC channel in SD 576i or 480i format.   |
| FW-ELC-8K-HD-MP2            | Firmware option enabling output of one MPEG-2 channel in HD 1080i or 720p format. This option also enables output in MPEG-2 SD format.   |
| FW-ELC-8K-SD-MP2            | Firmware option enabling output of one MPEG-2 channel in SD 576i or 480i format.   |
| FW-ELC-8K-608TO708-CC-XCODE | Firmware option enabling transcoding of Closed Caption from CEA-608 to CEA-708 format.   |
| FW-ELC-8K-ANYCODEC-HD       | Firmware option enabling output of one video channel in any HD codec: HD MPEG-2 or HD AVC.   |
| FW-ELC-8K-ANYCODEC-SD       | Firmware enabling output of one video channel in any SD codec: SD MPEG-2 or SD AVC.  |
| FW-ELC-8K-ANYFORMAT         | Firmware enabling output of one video channel in any format or codec: SD MPEG-2, SD AVC, HD MPEG-2, HD AVC or Low Resolution Channel (96x96, 128x96 or 192x192) MPEG-4 AVC baseline profile.   |
| FW-ELC-8K-HD-MP2-3CH-DTMX   | Firmware enabling 3 channels HD MPEG-2 encoding and DiviTrackMX statmux in the box.  |
| FW-ELC-8K-HD-MP2-4CH-DTMX   | Firmware enabling 4 channels HD MPEG-2 encoding and DiviTrackMX statmux in the box.  |
| FW-ELC-8K-PIP               | Firmware option for Electra 8200, enabling output of one Low Resolution Channel (96x96, 128x96 or 192x192) MPEG-4 AVC baseline profile.  |
| FW-ELC-8K-PSIP-SPOOLING     | Firmware option enabling PSIP table carousel delivered to the platform over management IP from Triveni guidebuilder.   |
| FW-ELC-8K-UPCONV            | Firmware option enabling broadcast quality up conversion or cross conversion of the SD or HD input video. Supported features include 480i29.97 to 720p59.94 or 1080i29.97, 576i25 to 720p50 or 1080i25, 720p59.94 to 1080i29.97, 720p50 to 1080i25, 1080i29.97 to 720p59.94 or 1080i25 to 720p50 |

