

# Electra X

ADVANCED MEDIA PROCESSOR



## The Harmonic Electra™ X advanced media processor is the industry's first fully converged platform for broadcast and OTT delivery of SD, HD and Ultra HD content.

Featuring real-time encoding of SD, HD and 4K/UHD media, integrated high-quality branding and graphics, and reliable transport stream playout, Electra X offers programmers and service providers market-leading video quality, unparalleled function integration and increased operational flexibility in a cost-effective appliance.

Two models are available: the 1-RU Electra X2, ideal for all SD and HD media processing applications, and the 2-RU Electra X3, designed specifically for UHD encoding. At the heart of both units is the Harmonic PURE Compression Engine™, an advanced encoding technology that supports SD, HD and UHD formats and MPEG-2, MPEG-4 AVC and HEVC codecs for broadcast and over-the-top multiscreen delivery. Originally developed for our VOS™ virtualized media processing platform, the Harmonic PURE Compression Engine powers Electra X with superior video quality at minimum bandwidth.

Harmonic's industry-leading Intelligent Function Integration™ achieves its highest level to date in Electra X2. On-board video graphics and branding bring new levels of workflow efficiency to the video delivery chain, a capability that also preserves video quality by removing the need to inject baseband components into the IP workflow. Transport stream playout capabilities on Electra X2 include channel origination, linear ad insertion and SCTE automation control. Rich audio functionality on both Electra X2 and X3 includes encoding of Dolby® Digital Plus (E-AC-3) content and integrated audio leveling.

For premium UHD encoding applications, Electra X3 delivers real-time, broadcast-ready content at resolutions up to 2160p60 via HEVC.

As a next-generation media processing system, Electra X offers a new approach to encoding and channel playout. With its superior video quality, function integration, bandwidth efficiency and workflow flexibility, this multi-service, multi-codec, multi-function platform is sure to simplify your infrastructure, reduce costs and drive new revenue-generating services.

### Business Benefits

#### Reduced CAPEX and OPEX

The broad capabilities of Electra X media processors converge broadcast and multiscreen encoding and delivery functionality onto a single 1-RU or 2-RU appliance. The remarkable Intelligent Function Integration of Electra X2 reduces the number of devices required to build out a broadcast transmission chain, saving on both capital and operating expenditures and delivering exceptionally low total cost of ownership (TCO).

#### Simplified Workflows

With Electra X2, multiple encoding and playout operations can be controlled from a single interface. Reducing the number of discrete boxes in the broadcast chain also reduces network complexity, resulting in an operation that is easier to set up, manage and maintain.

## HIGHLIGHTS

- SD/HD MPEG-2, MPEG-4 AVC and HEVC encoding for broadcast and OTT multiscreen services
- Real-time, full-frame UHD/HEVC Main 10 broadcast encoding
- Harmonic PURE Compression Engine for market-leading video quality at the lowest bitrates
- Integrated video graphics and branding, without custom authoring tools or training
- Transport stream playout, enabling channel origination and linear ad insertion
- Optimized statistical multiplexing over IP
- Broadcast-grade up-conversion
- Rich audio functionality, including E-AC-3 encoding and Jünger Level Magic audio level adjustment
- Optional 3G/HD/SD-SDI input

**Accelerated Revenue Generation**

Electra X3 leverages Harmonic’s industry-leading compression expertise to provide cutting-edge, real-time UHD and HEVC encoding capabilities, allowing you to offer viewers the ultimate live viewing experience.

The integrated multi-function capabilities of Electra X2 add unmatched flexibility and efficiency to your operation; they also accelerate your ability to launch new revenue-generating services, such as over-the-top (OTT) streaming of live and time-shifted content, and the broadcasting of new HD channels. The deployment of premium content for both first and second screens is simplified as well.

With its onboard graphic capabilities, Electra X2 also enhances the ability to reinforce your on-air branding; for instance, by squeezing back a program’s end credits while previewing an upcoming show. You can efficiently generate new revenue streams via regionalized and “double-box” advertising opportunities, in which a live feed is squeezed back into a small box while a national, regional or local advertisement runs in a larger box. A “graphic avail” can also be offered to advertisers, in which a background slate is used to convey additional or localized company information while their ad plays.

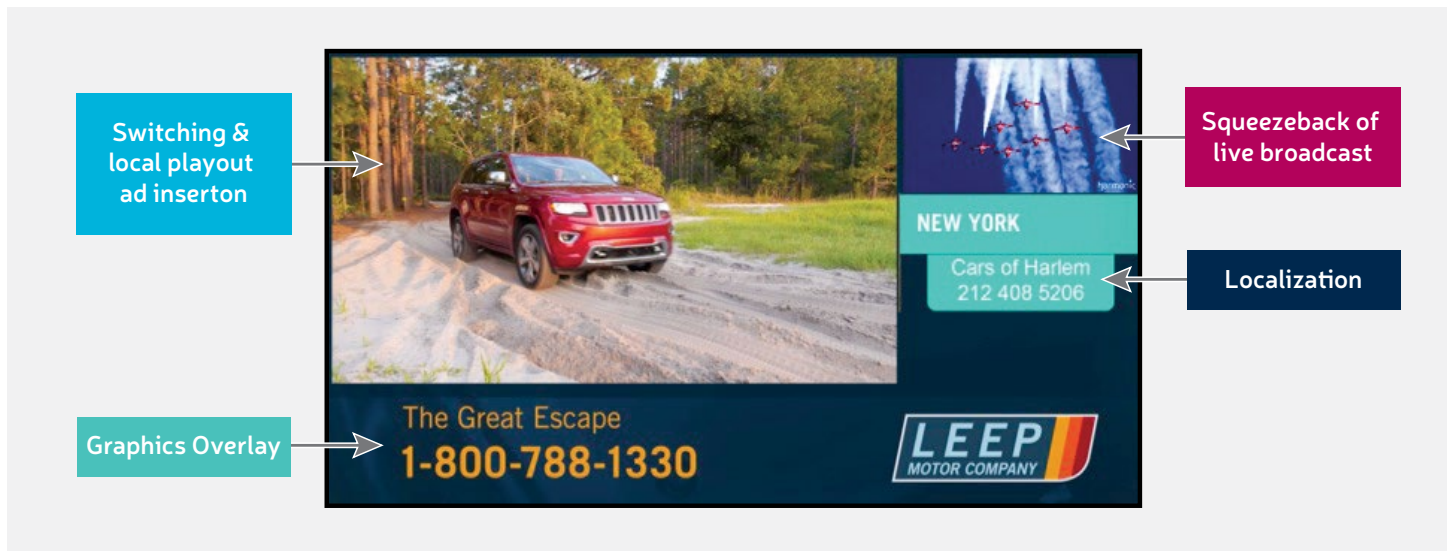
**Pay as You Grow Scalability**

Media processing capabilities on Electra X media processors are controlled through firmware licenses, assuring that you pay for only those features you need. As your business requirements change, adding new capabilities is as simple as activating a new license.

**World-Class Service and Support**

Harmonic stands behind Electra X media processors 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.

**Encoding and Playout with Integrated Branding**



*Integrated branding capabilities on Electra X2 provide the ability to monetize content in new ways, such as squeezing back your live feed while offering customers graphically intensive advertising opportunities.*

## Harmonic PURE Compression Engine



*The Harmonic PURE Compression Engine enables pristine video with up to 50% better efficiency, such as when comparing HEVC to AVC.*

### Technical Benefits

#### Video Compression Excellence

The Harmonic PURE Compression Engine utilizes Harmonic's market-leading experience in video compression algorithms and multi-pass encoding technologies to provide superior video quality at the lowest possible bitrates. Delivering significantly improved efficiency and simplified upgradeability over competing encoder technologies, Harmonic PURE Compression also enables true codec independence. MPEG-2, MPEG-4 AVC and HEVC transport streams are supported, as are the most common SD and HD content formats for broadcast, cable, satellite, IPTV and OTT delivery — including constant, variable and adaptive bitrate streaming. Full-frame UHD encoding (no partitions or slices) at 60 fps is available on Electra X3.

#### Preprocessing

Advanced noise-reduction capabilities include Harmonic's signature motion-compensated temporal filtering (MCTF) to enhance the appearance of incoming material. Electra X processors also support powerful deinterlacing to cleanly deliver progressive formats.

#### High-Quality Graphics and Branding

Electra X2 possesses a unique set of graphics and branding capabilities tailored to the requirements of content distribution and service delivery. Drawing upon the advanced functionality of the Harmonic Spectrum ChannelPort™ inte-grated channel playout system, dynamic text, regulatory and station logos, and rich branding elements are easily added to video channels. Up to eight graphics layers are supported, and graphics elements can be shared across all distribution channels, including mobile devices and the web. Advanced digital video effects, including squeezeback with dynamic text insertion, full slate insertion, and independent branding on each channel, enable the creation of sophisticated on-air looks — and add the ability to monetize second screens.

#### Clip Playout

Electra X2 contains many advanced playout features, including:

- Clip playback of MPEG-2 and AVC transport stream wrapped assets
- Branding and regulatory marks
- Automation system control via SCTE interface
- Independent branding of output services

#### Statmux Over IP

Electra X2 and X3 processors both maximize the efficiency and flexibility of statistical multiplexing through tight integration with Harmonic ProStream® stream processors and DiviTrackIP™ statmux technology. Applicable for either LAN or distributed WAN environments, DiviTrackIP can support up to 300 ms of WAN round-trip delay, auto-adjust to IP network variations, and form MPEG transport streams with up to 64 channels per pool.

#### SD-to-HD Up-Conversion

Featuring integrated broadcast-quality up-conversion, Electra X2 media processors are ideally suited for applications such as HD simulcast of an existing SD channel lineup.

### Audio Processing

Electra X2 and X3 processors both support embedded audio and can natively encode AC-3, E-AC-3, AAC and HE-AAC, all available via firmware license. Integrated Jünger Level Magic™ enables compliance with the CALM Act by automatically eliminating audio level changes both within a channel and when switching from one channel to another.

### Powerful Control

Electra X processors are managed via Harmonic's NMX™ Digital Service Manager, a definitive video network management solution encompassing a powerful set of tools for monitoring and managing compressed digital media services. When paired with other NMX-controlled systems, such as Harmonic's ProStream 9100 high-density stream processor and ProMedia® X Origin multiscreen media server, Electra X2 and X3 become part of a highly scalable, converged solution for the deployment of linear broadcast and OTT video services.

### Rock-Solid Stability

Electra X media processors are built on the same proven Linux OS that powers Harmonic Spectrum media servers, the industry's most trusted server platform. Redundant power supplies and fans further enhance system reliability. This rock-solid foundation provides broadcasters and service providers with the peace of mind demanded for mission-critical operations where system downtime is not an option.

## ELECTRA X2 SPECIFICATIONS

### INPUT/OUTPUT

|                         |   |
|-------------------------|---|
| Ingest & Playout Format | MPEG-TS via IP  |
| Connectors              | Two dedicated TS inputs<br>Two dedicated TS outputs<br>Two dedicated management ports |
| 3G/HD/SD-SDI Input      | Eight Mini DIN ports (optional)   |

### DECODING

|                     |  |
|---------------------|--|
| Video (4:2:0/4:2:2) | MPEG-2, MPEG-4 AVC<br>Up to 1080p @ 59.94                                    |
| Audio               | MPEG-1 Layer II, AC-3, E-AC-3, Dolby E, HE-AAC<br>Mono, stereo, multichannel |

### BROADCAST VIDEO PROCESSING

|                                |   |
|--------------------------------|---|
| Codecs                         | MPEG-2 MP @ ML<br>MPEG-2 MP @ HL<br>MPEG-4 AVC MP @ L3<br>MPEG-4 AVC HP @ L4<br>HEVC Main 10  |
| SD Resolutions and Frame Rates | 576i @ 25<br>480i @ 29.97   |
| HD Resolutions and Frame Rates | 720p @ 50 and 59.94<br>1080i @ 25 and 29.97<br>1080p @ 24, 50 and 59.94   |
| Up/Down/Cross-Conversion       | 480i @ 29.97, 720p @ 59.94, and 1080i @ 29.97<br>576i @ 25, 720p @ 50, and 1080i @ 25<br>720p @ 59.94 and 1080i @ 29.97 or 1080i @ 29.97 and 720p @ 59.94 |
| Processing Capabilities        | Scene-cut and fade/dissolve detection<br>Dynamic GOP management with adaptive I-frame insertion<br>CBR, VBR (DTolP statmux with ProStream 9100)           |
| Video Pre-Processing           | Hierarchical LookAhead™<br>Motion-compensated temporal filtering (MCTF)<br>Horizontal filter  |

### MULTISCREEN VIDEO PROCESSING

|                               |   |
|-------------------------------|---|
| Codecs                        | AVC (H.264) Main, Baseline<br>HEVC Main 10  |
| Multi-Machine Synchronization | Split adaptive bitrate encoding across multiple machines (check for availability) |
| Container                     | TS over UDP, each video delivered as a separate SPTS                              |
| Aspect Ratio Handling         | 4:3, 16:9   |

### AUDIO PROCESSING

|               |  |
|---------------|--|
| Codecs        | MPEG-1 Layer II (stereo)<br>AC-3, E-AC-3, MPEG-2/4 AAC LC (ADTS/LATM),<br>MPEG-4 HE-AAC v1/2 (ADTS/LATM) (stereo and 5.1 surround) |
| Input         | Embedded or TS   |
| Level Control | Jünger Level Magic audio level adjustment  |

### ANCILLARY DATA SPECIFICATION

|                                 |   |
|---------------------------------|---|
| Closed Captions                 | EIA-608<br>EIA 708 ATSC A/53<br>608/708 conversion option |
| VANC Data                       | Teletext<br>WSS<br>AFD<br>VITC                            |
| Digital Program Insertion (DPI) | SCTE 104 over Ethernet<br>SCTE 104/VANC to SCTE 35        |

### GRAPHICS & BRANDING

|  |  |
|--|--|
| Adobe Creative Suite compatibility   |  |
| Integrated DVE   |  |
| Independent branding for each service  |  |
| Up to 8 layers of graphics   |  |
| Logo insertion   |  |
| Support for all standard image formats (PNG, JPG, TIFF, GIF), sequences (Targa, FLV) and typefaces |  |

### PLAYOUT

|  |  |
|--|--|
| Clip playout from local disk (1 TB storage) or NAS |  |
| Content origination                                |  |
| Digital program insertion                          |  |
| Slate insertion                                    |  |

### SYSTEM MANAGEMENT

|                                       |  |
|---------------------------------------|--|
| Harmonic NMX™ Digital Service Manager |  |
|---------------------------------------|--|

## ELECTRA X2 SPECIFICATIONS (CONT)

### POWER

|                          |                               |
|--------------------------|-------------------------------|
| Power Supply             | Dual, hot-swappable from rear |
| Input Voltage Range      | 90-264 VAC                    |
| Input Frequency Range    | 47-63 Hz                      |
| <b>Power Consumption</b> |                               |
| ELC-X2-G2-AC-AA-S        | 481 W                         |
| ELC-X2-G2-AC-AA          | 450 W                         |
| ELC-X2-G2-AC-B-S         | 240 W                         |
| ELC-X2-G2-AC-B           | 210 W                         |

### PHYSICAL

|                        |  |
|------------------------|--|
| Dimensions (W x H x D) | 17.67 in x 1.7 in x 27.75 in (1 RU)<br>44.9 cm x 4.32 cm x 70.5 cm |
| Weight                 | 36 lbs/16.33 kg  |

### ENVIRONMENTAL

|                               |  |
|-------------------------------|--|
| Cooling                       | Front to rear airflow<br>Temperature-controlled fans   |
| Operating Temperature         | +32° to +95° F<br>0° to +35° C   |
| Storage Temperature           | -40° to +158° F<br>-40° to +70° C  |
| Operating Humidity            | <95% non-condensing  |
| Safety                        | IEC/EN 60950-1<br>CAN/CSA-C22.2 No. 60950-1<br>BIS IS13252 (Part 1):2010<br>NOM-19-SCFI-1998   |
| Electromagnetic Compatibility | EN55022:2010<br>EN55024:2010<br>ICES-003, Issue 5:2012, Class A<br>47 CFR, FCC Part 15, Subpart B, Class A<br>AS/NZS CISPR22<br>KN 22 and KN 24<br>VCCI V-3/2011 |

## ELECTRA X3 SPECIFICATIONS

### INPUT/OUTPUT

|                   |   |
|-------------------|---|
| Connectors        | Two dedicated TS inputs<br>Two dedicated TS outputs<br>Two dedicated management ports |
| Quad 3G-SDI Input | Four Mini DIN ports   |

### BROADCAST VIDEO PROCESSING

|                                |                          |
|--------------------------------|--------------------------|
| Codec                          | HEVC Main 10             |
| UHD Resolution and Frame Rates | 2160p @ 24, 50 and 59.94 |

### AUDIO PROCESSING

|               |   |
|---------------|---|
| Codecs        | AC-3, E-AC-3, AAC, HE-AAC (stereo and 5.1 surround) |
| Input         | Embedded  |
| Level Control | Jünger Level Magic audio level adjustment           |

### ANCILLARY DATA SPECIFICATION

|                 |                  |
|-----------------|------------------|
| Closed Captions | EIA 708          |
| VANC Data       | Teletext (OP-47) |

### SYSTEM MANAGEMENT

|                                       |  |
|---------------------------------------|--|
| Harmonic NMX™ Digital Service Manager |  |
|---------------------------------------|--|

### POWER

|                       |                               |
|-----------------------|-------------------------------|
| Power Supply          | Dual, hot-swappable from rear |
| Input Voltage Range   | 90-264 VAC                    |
| Input Frequency Range | 47-63 Hz                      |
| Power Consumption     | 650 W                         |

### PHYSICAL

|                        |   |
|------------------------|---|
| Dimensions (W x H x D) | 16.93 in x 3.44 in x 27.95 in (2 RU)<br>43.00 cm x 8.74 cm x 70.99 cm |
| Weight                 | 47 lbs/21.32 kg   |

### ENVIRONMENTAL

|                               |  |
|-------------------------------|--|
| Cooling                       | Front to rear airflow<br>Temperature-controlled fans   |
| Operating Temperature         | +32° to +95° F<br>0° to +35° C   |
| Storage Temperature           | -40° to +158° F<br>-40° to +70° C  |
| Operating Humidity            | <95% non-condensing  |
| Safety                        | IEC/EN 60950-1<br>CAN/CSA-C22.2 No. 60950-1<br>BIS IS13252 (Part 1):2010<br>NOM-19-SCFI-1998   |
| Electromagnetic Compatibility | EN55022:2010<br>EN55024:2010<br>ICES-003, Issue 5:2012, Class A<br>47 CFR, FCC Part 15, Subpart B, Class A<br>AS/NZS CISPR22<br>KN 22 and KN 24<br>VCCI V-3/2011 |

