Electra X2

ADVANCED MEDIA PROCESSOR

The Harmonic Electra™ X2 advanced media processor is the industry's first fully converged platform for broadcast and OTT delivery of SD and HD video.

Featuring real-time encoding and integrated, high-quality branding and graphics, Electra X2 offers programmers and service providers market-leading video quality, unparalleled function integration and increased operational flexibility in a cost-effective 1-RU appliance.

At the heart of Electra X2 is the Harmonic PURE Compression Engine™, an advanced encoding technology that supports SD and HD formats and MPEG-2, MPEG-4 AVC and HEVC codecs for broadcast and over-the-top multiscreen delivery. Originally developed for our VOS™ cloud-native media processing platform, the Harmonic PURE Compression Engine powers Electra X2 with superior video quality at minimum bandwidth. Users can also employ EyeQ™ real-time video optimization, Harmonic's enhancement for PURE Compression that ensures delivery of the highest video quality across OTT delivery networks while reducing bandwidth consumption by up to 50%.

Harmonic's industry-leading 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. Rich audio functionality includes encoding of Dolby® Digital Plus (E-AC-3) content and integrated audio leveling.

As a next-generation media processing system, Electra X2 offers a new approach to encoding. Uncompressed video over IP workflows are supported via optional SMPTE ST 2022-6 ingest. High dynamic range (HDR) content is supported. Dynamic ad insertion (DAI) is also available. 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 the Electra X2 media processor converge broadcast and multiscreen encoding and delivery onto a compact COTS Intel® server. This remarkable function integration 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, encoding, graphics and branding operations are controlled from a single interface. Reducing the number of discrete boxes in the broadcast chain reduces network complexity, resulting in an operation that is easier to set up, manage and maintain.

Accelerated Revenue Generation

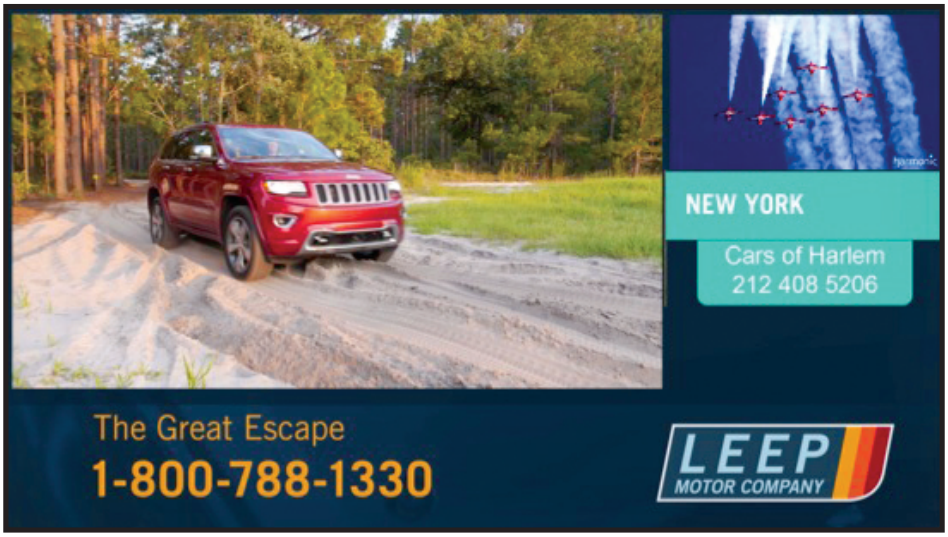
The integrated multi-function capabilities of Electra X2 add unmatched flexibility and efficiency to your operation; they also accelerate your ability to launch new revenue-generating services, such as over-the-top (OTT) streaming of live and time-shifted content, and the broadcasting of new HD channels. Support for DAI, as well as integration with leading third-party systems such as Sky AdSmart, provide additional opportunites to grow your business.

HIGHLIGHTS

- SD/HD MPEG-2, MPEG-4 AVC and HEVC encoding for broadcast and OTT multiscreen services
- Harmonic PURE Compression Engine and EyeQ technologies for market-leading video quality at the lowest bitrates
- Integrated video graphics and branding, without custom authoring tools or training
- 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 SMPTE 2022-6 support for uncompressed video over IP
- HDR signaling

Brand Reinforcement
With its onboard graphic capabilities, Electra X2 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 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 the Electra X2 media processor is 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.



Integrated graphics capabilities on Electra X2 provide the ability to monetize content in new ways, such as squeezing back a live feed to present national, regional or personalized ads

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 Main 10 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.

For OTT applications, Harmonic's optional EyeQ technology leverages the function of the human visual system to lower bandwidth consumption by up to 50% while ensuring the delivery of the highest video quality. Directly improving the bottom line through reduced CDN and storage costs, EyeQ delivers its bandwidth savings using a standard AVC codec and with no requirement to upgrade client devices. The technology ensures that video quality is optimized, that buffering is reduced, and that your viewers' quality of experience is improved.

Preprocessing
Advanced noise-reduction capabilities include Harmonic's signature motion-compensated temporal filtering (MCTF) to enhance the appearance of incoming material. The Electra X2 processor also supports 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. Dynamic text, regulatory and station logos, and rich branding elements can be 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.

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

Statmux Over IP
The Electra X2 processor maximizes the efficiency and flexibility of statistical multiplexing through tight integration with the Harmonic ProStream® X video stream processor and gateway, and Flextream™ IP (formerly DiviTrackIP™) statmux technology. Flextream IP connects remote Electra X2 encoders with ProStream X systems across a LAN or WAN, allowing any ProStream X in the network to efficiently manage the encoders' statmux pools. ProStream X also supports regional statmux capability for the terrestrial market, allowing a single Electra X2 instance to be part of multiple Flextream IP pools.

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
The Electra X2 processor supports 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
The Electra X2 processor is 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 the ProStream X stream processor and ProMedia® X Origin multiscreen media server, Electra X2 becomes part of a highly scalable, software-based solution for the deployment of linear broadcast and OTT video services.

Rock-Solid Stability
The Electra X2 processor is built on the same proven Linux OS that powers Harmonic Spectrum media servers, the industry' 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.

World-Class Service and Support
Harmonic stands behind the Electra X2 media processor 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.

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SPECIFICATIONS

INPUT/OUTPUT

Connectors	Two dedicated TS inputs Two dedicated TS outputs Two dedicated management ports
3G/HD/SD-SDI Ingest	Eight or 16 mini-DIN ports (optional)
SMPTE ST 2022-6 Ingest	Optional

DECODING

Video (4:2:0/4:2:2)	MPEG-2, MPEG-4 AVC, HEVC Main 10 (4:2:0 only) Up to 1080p @ 59.94
Audio	MPEG-1 Layer II, AC-3, E-AC-3, Dolby E, HE-AAC Mono, stereo, multichannel

BROADCAST VIDEO ENCODING

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

MULTISCREEN VIDEO ENCODING

Codecs	AVC (H.264) Main, Baseline HEVC Main 10
Video Optimization	Harmonic EyeQ
Container	TS over UDP, each video delivered as a separate SPTS
Aspect Ratio Handling	4:3, 16:9

AUDIO ENCODING

Codecs	MPEG-1 Layer II (stereo) AC-3, E-AC-3, MPEG-2/4 AAC LC (ADTS/LATM), 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 EIA 708 ATSC A/53 608/708 conversion option
VANC Data	Teletext WSS AFD VITC
Digital Program Insertion (DPI)	SCTE 104 over Ethernet SCTE 104/VANC to SCTE 35

GRAPHICS & BRANDING

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

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

Platform	Typical	Max
ELC-X2-G2-AC-AA	460 W	580 W
ELC-X2-G2-AC-AA-S	480 W	600 W
ELC-X2-G2-AC-B	190 W	290 W
ELC-X2-G2-AC-B-S	210 W	310 W
ELC-X2-G2-AC-GG	380 W	490 W
ELC-X2-G2-AC-GG-S	400 W	510 W
ELC-X2-G2-AC-GG-SS	410 W	530 W
ELC-X2-G2-AC-GG-Y	390 W	500 W

PHYSICAL

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

ENVIRONMENTAL

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

ORDERING INFORMATION

Part Number	Description
ELC-X2-G2-AC-AA	Electra X2 advanced compression platform with AA G2 CPU and dual hot-swap AC power supplies
ELC-X2-G2-AC-AA-S	Electra X2 advanced compression platform with AA G2 CPU, 8-port SDI module and dual hot-swap AC power supplies
ELC-X2-G2-AC-B	Electra X2 advanced compression platform with B G2 CPU and dual hot-swap AC power supplies
ELC-X2-G2-AC-B-S	Electra X2 advanced compression platform with B G2 CPU, 8-port SDI module and dual hot-swap AC power supplies
ELC-X2-G2-AC-GG	Electra X2 advanced compression platform with GG G2 CPU and dual hot-swap AC power supplies
ELC-X2-G2-AC-GG-S	Electra X2 advanced compression platform with GG G2 CPU, 8-port SDI module and dual hot-swap AC power supplies
ELC-X2-G2-AC-GG-SS	Electra X2 advanced compression platform with GG G2 CPU, dual 8-port SDI modules and dual hot-swap AC power supplies
ELC-X2-G2-AC-GG-Y	Electra X2 advanced compression platform with GG G2 CPU, dual-port 10-GbE module and dual hot-swap AC power supplies

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