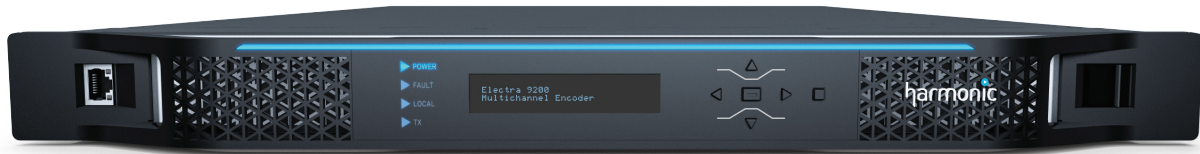


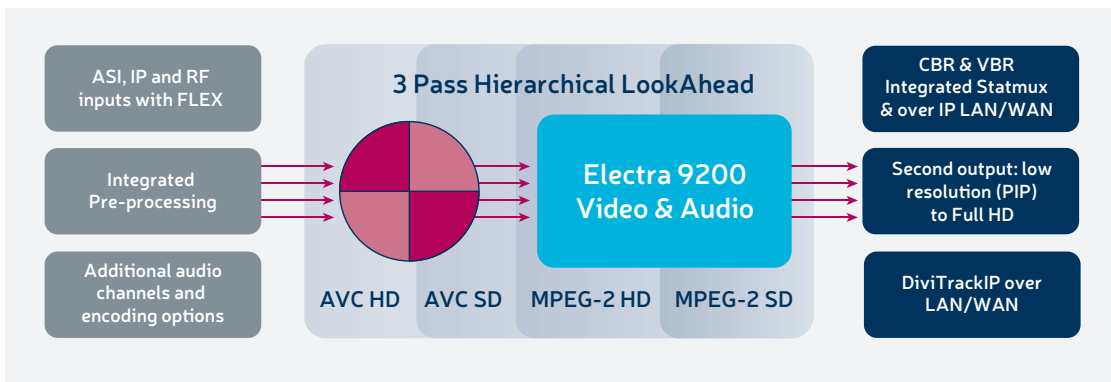
# Electra™ 9200

UNIVERSAL MULTI-SERVICE ENCODER



The latest evolution of Harmonic’s market-leading Electra™ compression family, the Electra 9200 is a multi-channel, multi-service encoder in a compact, energy-efficient 1-RU chassis. Part of a complete video headend solution, the encoder supports main and secondary SD or HD channels of constant bitrate (CBR) or variable bitrate (VBR) video using either MPEG-2 or MPEG-4 AVC encoding. It offers high bandwidth efficiency and channel density—up to four audio/video input processing modules per chassis.

Superior video quality merges with Harmonic intelligent function integration in the Electra 9200 to deliver a high-performance unit that helps increase efficiency while lowering service providers’ capital and operating expenses. Comprehensive features include integrated audio encoding tools, GbE networking, flexible internal video routing, and enhanced serviceability via removable power supplies, fan assembly, compression modules and processing cards.



## Market Benefits

### Flexible Solution for Cable

The Electra 9200 incorporates proven Harmonic compression technology to support legacy CBR and VBR applications in both HD and SD MPEG-2 formats, and offers support for new IPTV-over-cable applications.

### 4:1 HD MPEG-2 for Cable

The Electra 9200 can encode up to four statistically multiplexed HD MPEG-2 services within a single chassis, all from HD-SDI, IP or ASI inputs. This feature gives cable operators a high-density, high-value solution that also delivers exceptional video compression performance.

## HIGHLIGHTS

- High-quality low-bitrate MPEG-2 or MPEG-4 AVC encoding of SD or HD video with Harmonic’s Hierarchical LookAhead and pre-processing technologies
- Optional dual independently compressed outputs per input
- Up to 8 broadcast services/32 multiscreen profiles per chassis
- Multiscreen mobile and web delivery with IDR-synchronized AVC transport streams
- Flexible internal video router feeds any audio/video processing module from any source
- Broadcast-grade up/down converter and deinterlacer
- Integrated statmux, or statmux over IP for LAN and WAN
- High-quality integrated decoding with FLEX® technology option
- 3DTV frame compatible

## Maximize Channel Capacity for Satellite

Harmonic compression technology maximizes bandwidth efficiency to provide more channels per transponder.

## Ideal for IPTV

Designed to deliver broadcast-quality HDTV at less than 5 Mbps, the Electra 9200 maximizes reach and supports Microsoft® Mediarem® picture-in-picture.

## Business Benefits

### Reduced CAPEX and OPEX

Multiple services and functions can be delivered from a single high-density, low-power platform.

### Pay As You Grow

Processing modules and licenses can be added to the Electra 9200 chassis as your market needs evolve, so you pay only for the features required.

### SD MPEG-2 Business Continuity

Content is increasingly produced and distributed exclusively in HD, although legacy SD MPEG-2 set-top boxes are still in widespread use. The Electra 9200 resolves this issue by simultaneously generating both an HD AVC and an SD down-converted output signal from a single HD input.

### Maximize Service Uptime

Electra 9200's field-replaceable power supply, fan assembly and processing modules improve serviceability while reducing maintenance costs.

## Technical Benefits

### Compression Performance

The Harmonic Hierarchical LookAhead™ multi-pass encoding architecture employs market-leading ASIC and programmable DSP/FPGA technologies to provide superior video quality at the lowest possible bitrates. This silicon architecture also provides high-quality deinterlacing and compression for delivery of progressive multiscreen profiles.

### Integrated Secondary Output

The Electra 9200 simplifies the delivery of multiple resolution channels from the same video input—from low-resolution small-picture formats to full HD for SDV or time-shifted TV. The secondary output effectively doubles encoder capacity while offering support for hybrid applications such as down-converting the main channel from HD to SD, or providing a primary VBR channel and a secondary CBR channel (or vice versa).

### Dual Power Supplies

Optional redundant, hot-swappable power supplies offer high reliability and simplified serviceability.

### Integrated Crosspoint Router

An internal video crosspoint router allows video to be routed at will from any input to any audio/video processing module.

### Rich Feature Set

Available functionality includes IP or ASI outputs, support for multiple audio processing adapters, and optional FLEX integrated multiformat decoder with IP, ASI or 8-VSB inputs.

### Integrated Statmux

The Electra 9200 streamlines system architectures and reduces the hardware footprint with DiviTrackMX™, Harmonic's widely deployed integrated statistical multiplexing solution.

### Statmux Over IP

Using a cost-effective IP infrastructure, the Electra 9200 maximizes the efficiency and flexibility of statistical multiplexing with the Harmonic DiviTrackIP™ technology. Applicable for either LAN or distributed WAN environments, DiviTrackIP can support up to 300 ms of WAN roundtrip delay, auto-adjust to IP network variations, and form systems with up to 64 channels per pool.

### Preprocessing

The Electra 9200 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 compression artifacts that may be present in the video source. A sharpening filter can also enhance the appearance of incoming material. These same technical foundations support powerful deinterlacing to cleanly deliver progressive formats.

### Audio Processing

With standard audio processing, Electra 9200 supports embedded audio and can natively encode up to three stereo pairs (or a single multichannel encode) of MPEG-1 Layer II audio. Dolby® Digital (AC-3), Dolby Digital Plus (E-AC-3) and Dolby E audio can be passed through, and AC-3 and AAC/HE-AAC encoding is available via firmware license. Optional audio input modules (AHC-RAC, IOM-RAC2) can extend Electra's functionality and density to address a variety of audio processing scenarios, including transcoding from Dolby E sources or transcoding from AC-3 to E-AC-3.

## SPECIFICATIONS

### VIDEO SPECIFICATIONS

<b>Video Compression and Bitrate (CBR/VBR) 4:2:0</b>	
<b>Encoding Options</b>	
MPEG-2 MP @ ML	1-15
MPEG-2 MP @ HL	2-23 Mbps
	24-45 Mbps, MPEG-2 @ 29.97Hz
MPEG-4 AVC MP @ L3	0.3-8 Mbps
MPEG-4 AVC HP @ L4	1-20 Mbps
<b>Video Processing</b>	Hierarchical LookAhead multipass processing Scene-cut and fade/dissolve detection Dynamic GOP management with adaptive I-picture and B-picture placement Automatic input format (1080i or 720p) detection and switching
<b>Video Input Filtering</b>	Motion-compensated temporal filtering (MCTF) Horizontal filter Mosquito noise reduction filter Sharpening filter Input deblocking filter
<b>Aspect Ratios</b>	4:3 and 16:9 AFD and WSS control
<b>SD Resolutions and Frame Rates</b>	576i @ 25 480i @ 29.97 x 720, 704, 640, 544, 528, 480, 352 pixels
<b>HD Resolutions and Frame Rates</b>	720p @ 50 and 59.94 x 1280 pixels 1080i @ 25 and 29.97 1080PsF24, x 1920, 1440 and 1280 pixels
<b>Up/Down/Cross Conversion</b>	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

### ANCILLARY DATA SPECIFICATIONS

<b>Closed Captioning</b>	CEA 608 from Line 21 CEA 708 VANC extraction per SMPTE 334M CEA 708 external caption server per SMPTE 333M
<b>Range of Legacy Support Options</b>	608 to 708 conversion
<b>Ancillary Data and VBI</b>	Digitized waveform or VANC extraction per SMPTE 2031 AFD and Bar, VITC, AMOL, TV Guide, WST (Teletext), Inverted WST, WSS, VPS, PSIP spooling
<b>Digital Program Insertion</b>	SCTE 35 insertion via SCTE 35 and SCTE 104 DPI triggers

### AUDIO SPECIFICATIONS

<b>Channels</b>	Up to three stereo pairs or one 5.1 multichannel per video service
<b>Audio Formats</b>	MPEG-1 Layer II, AC-3 (2.0), AAC, HE-AAC (v1 and v2) native encoding AC-3 (2.0 and 5.1), E-AC-3 (2.0 and 5.1) and AAC/HE-AAC (2.0 and 5.1) passthrough
<b>Operating Modes</b>	Mono, stereo
<b>Encoding Bitrate</b>	
MPEG-1 Layer II	56-384 kbps
AC-3	AC-3 56-640 kbps
AAC	AAC 32-384 kbps
HE-AAC	HE-AAC 32-128 kbps
<b>Optional Audio Modules</b>	Optional Audio Modules AHC-RAC, IOM-RAC2 (See Electra 9200 Audio Input Modules datasheet)

### INPUTS AND OUTPUTS

<b>Video Inputs</b>	Up to four serial digital inputs per SMPTE 259M (SD-SDI) or SMPTE 292M (HD-SDI)
<b>Default Audio Inputs</b>	Embedded audio; up to three stereo pairs or one multichannel per video service
<b>Transport Outputs</b>	MPEG-2 transport stream over UDP/IP (redundant 100/1000 BaseT connectors)
<b>Transport Stream Input Options</b>	AVC over ASI or GbE MPEG-2 over ASI, GbE or 8VSB
<b>Transport Stream Output Option</b>	ASI

### SYSTEM MANAGEMENT

Harmonic NMX™ Digital Service Manager
Stand-alone web user interface

### POWER

<b>Input Voltage Range</b>	85-132 VAC or 170-264 VAC 42-60 VDC
<b>Line Frequency</b>	47-63 Hz
<b>Typical Consumption</b>	150 W (one channel) 200 W (two channels) 250 W (three channels) 300 W (four channels)
<b>Dual Power Supply Option</b>	

### PHYSICAL

<b>Dimensions (W x H x D)</b>	19 in x 1.75 in x 27 in (1 RU) 48.26 cm x 4.45 cm x 68.69 cm
<b>Weight</b>	32 lbs/14.5 kg

### ENVIRONMENTAL

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

## HARDWARE OPTIONS

Part Number	Description
ELC-9200-CHS-AC	Electra 9200 SD or HD, MPEG-2/AVC encoder hardware platform. 1 RU rack mountable chassis. AC power supply.
ELC-9200-CHS-DC	Electra 9200 SD or HD, MPEG-2/AVC encoder hardware platform. 1 RU rack mountable chassis. DC power supply.
ELC-9200-CHS2-AC	Electra 9200 SD or HD, MPEG-2/AVC encoder hardware platform. 1RU rack mountable chassis. Dual AC power supplies.
ELC-9200-CHS2-DC	Electra 9200 SD or HD, MPEG-2/AVC encoder hardware platform. 1 RU rack mountable chassis. Dual DC power supplies.
ELC-9K-SID	Electra 9200 serial digital video input module. Each module supports two HD/SD SDI inputs with up to three stereo pairs of embedded audio per video.
ELC-9K-AVPM1	Electra 9200 audio/video processing module, providing up to two broadcast or eight multiscreen output streams per module.
IOM-FLEX-DHC-1	Optional video/audio decoding module for Electra 9200 encoders. Supports up to two video and two audio services per card.
IOM-ASI	DVB-ASI input/output module for Electra and Ion encoders. Four DVB-ASI inputs or outputs. BNC connectors.
IOM-8VSB	ATSC receiver input module for Electra and Ion encoders. Includes four 8VSB tuners. MPEG-2 TS outputs with signal lock indication. For use in conjunction with the FLEX decoder module only.
IOM-AHC-RAC	Optional multichannel audio encoding module for Electra encoders, supporting AC-3 2.0, AC-3 5.1, AAC 2.0, AAC 5.1, HE-AAC v2 2.0 audio encoding
IOM-RAC2	Optional dense multichannel audio decoding board for Electra encoders, supporting up to 16 streams of AC-3 and E-AC-3 encoding; Dolby E, AC-3, E-AC-3, AAC/HE-AAC and MPEG-1 Layer II decoding; and simultaneous Dolby E to AC-3 2.0 and 5.1 transcoding.
IOM-AB-PWR-SWITCH	A/B power switch module for Electra and Ion encoders. Allows connection of dual, switchable power sources to the same Ion/Electra chassis. Autosensing. AC 110-240V power sources only.