

HIGHLIGHTS

- Ultra-low bit rate encoding
- Advanced MPEG-4 AVC HP@L4 video compression
- Up to 4 channels per chassis
- Low resolution channels for applications such as picture-in-picture (PiP), dynamic mosaics and streaming to the PC
- MPEG-2 TS/UDP over IP output
- Multi-pass LookAhead CBR or VBR encoding
- Statmux over IP in LAN and WAN environments with DiviTrackIP™
- Supports multiple HD formats including 1080i, 1080PsF24 and 720p
- Fade/dissolve and scene cut detection
- Flexible GOP structures with Adaptive I-frame and B-frame insertion
- High quality integrated decoding with FLEX™ technology option
- ENRGY™ integrated noise reduction with Motion Compensated Temporal Filtering
- Supports SCTE104 DPI triggering of SCTE 35 cue message insertion in TS
- Digital audio/video inputs
- Up to ten stereo or twenty mono audio channels
- Advanced audio: HE-AAC 2.0/5.1 encoding, Dolby E to AC-3 transcoding



Harmonic's Electra® 7000 Encoder is the world's first 1-RU high definition (HD) encoder with multi-service capability, flexibly delivering multiple full and low resolution services to a range of devices. Designed to address the ever-increasing demand for advanced video and audio services, the high performance Electra 7000 provides up to four channels of superior quality constant bit rate (CBR) or variable bit rate (VBR) MPEG-4 AVC (H.264) video. It is the industry's first HD encoder based on ASIC processing technology and provides a full 30 – 40% compression gain over the first generation of DSP-based MPEG-4 HD encoders. As with most advanced technologies, programmable devices provide faster time-to-market, but as deployment volumes increase, dedicated ASIC processors offers greater performance and density.

With its standard IP interfaces, the Electra 7000 can be easily incorporated into Harmonic's DiviTrackIP™ closed-loop statistical multiplexing solution. DiviTrackIP provides significant operational advantages and cost benefits by connecting encoders and multiplexers via a switched IP network rather than port-to-port ASI interconnects. As a result, any encoder anywhere in the network can efficiently be part of any multiplex, essentially creating a "virtual headend."

Backed by Harmonic's track record of innovation, system interoperability and exceptional support, the Electra 7000 is the most advanced HD encoding platform for IPTV, satellite, video-to-the-handheld, cable or terrestrial applications available today.

DTH satellite operators can quickly and efficiently launch new HD services and improve service-carrying capacity with the Electra 7000 by combining several MPEG-4 AVC HD channels in a single statistical multiplex. For telcos and other IP-based service providers, the Electra 7000's highly bandwidth efficient MPEG-4 CBR encoding and native IP output make it possible to deliver exciting and competitive HD services.

BENEFITS OF THE ELECTRA 7000

- **Outstanding performance with system-on-chip compression engine** – Leveraging the increased processing power of a cutting edge MPEG-4 AVC compression ASIC, the Electra 7000 performs larger, denser motion estimation searches and delivers true multi-pass MPEG-4 encoding. Coupled with Harmonic's industry-leading ENRGY™ video pre-processing and multi-pass LookAhead encoding, the Electra 7000 presents a dramatic improvement in MPEG-4 AVC video quality.
- **Flexibility and density** – By offering up to four HD channels and multiple low resolution channels per device, operators can provide multiple, feature-rich services utilizing less space than required in a traditional headend.
- **Low resolution outputs** – The Electra 7000 is capable of simultaneously delivering low resolution channels for new applications such as picture-in-picture (PiP) and dynamic mosaics.
- **Native audio encoding** – Up to 10 stereo pairs of audio encoding are supported, in formats such as MPEG-1 Layer II, Dolby® Digital (AC-3) and AAC/HE AAC.
- **Support for all-IP infrastructure** – The Electra platform's native IP interface seamlessly integrates into scalable, low-cost IP networks.
- **Network management** – Harmonic's NMX Digital Service Manager™ simplifies mass configuring, monitoring and automated redundancy in both centralized and distributed architectures.



VIDEO SPECIFICATIONS

Video Compression (4:2:0 Encoding)	Main channels: MPEG-4 AVC ¹ , MP@L4 or HP@L4 Low resolution channels: MPEG-4 AVC MP@L1.3
Video Processing	LookAhead multi-pass processing Scene-cut and fade/dissolves detection Dynamic GOP management with adaptive I-frame and B-frames placement Automatic input format (1080i or 720P) detection and switching
Video Input Filtering	Motion compensated temporal filter (MCTF) Horizontal filter
Aspect Ratios	4:3 and 16:9
Video Formats	1080i, 1080PsF24 and 720P
Resolutions	1080i x 1920, 1440, 1280, 960 pixels and 720P x 1280, 960 pixels
Frame Rates	23.976 (1080PsF) 25, 29.97 (1080i) 50, 59.94 (720P)
Low Resolution	96x96, 128x96, 192x192
Encoding Bit-Rate	1 to 20 Mbps (4:2:0 CBR or VBR)
Ancillary Data	Closed Captioning VANC extraction per SMPTE 334M External caption server per SMPTE 333M Placement in video ES per ATSC CS-TSG-659r1
Digital Program Insertion (DPI)	SCTE35 insertion via SCTE104 triggers

AUDIO SPECIFICATIONS

Number of Channels (Native Encoding)	Default: up to 3 stereo pairs or one 5.1 audio service per video service Option: up to 5 Audio Encoding modules each supporting 2 stereo pairs or one 5.1 service
Audio Formats	MPEG-1 Layer II, Dolby Digital (AC-3) and AAC, HE AAC native encoding AC-3 and AAC/HE AAC pass-through
Analog Digitizing Resolution	24 bits
Analog Input Level	-18 to +4 dBu in .5 dBu steps Adjustments to place alignment tone at reference level at -20 dBFS
Operating Modes	Mono, dual channel, stereo, joint stereo, 5.1 multi-channel
Encoding Bit-Rates	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
THD + Noise	< 0.05% at 1 kHz with 48 kHz sampling
Frequency Response	< 3 dB 20 Hz to 20 kHz at 384 kbps /48 kHz

INPUTS AND OUTPUTS

Video Inputs	Up to 4 Serial Digital SMPTE 292M (HD-SDI)
Audio Inputs	Default: Embedded audio; up to 3 stereo pairs or one multi-channel Options: Digital (AES3/EBU or S/PDIF), Analog (balanced/unbalanced)
Transport Outputs	MPEG-2 Transport Stream over UDP/IP (redundant 100/1000 BaseT connectors)

SYSTEM MANAGEMENT

NMX Digital Service Manager
Front Panel Control

POWER

Input Voltage Range	85-132 VAC or 170-264 VAC 42-60 VDC
Line Frequency	47-63 Hz
Typical Consumption	110 W for ELC-7011 (1 channel) 260 W for ELC-7044 (4 channels)

ENVIRONMENTAL

Cooling	9 fans; air flow front to side
Operating Temperature Range	5° to +40° C
Storage Temperature Range	-20° to +80° C -4° to +176° F
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 ROHS Directive 2002/95/EC

PHYSICAL

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

HARDWARE OPTIONS

8-VSB Receiver
FLEX™ Video/Audio Decoding
GBE Transport Input
ASI Transport Input
AHC-RAC Multi-Channel Audio
AHC-561 Audio Transcoding from Dolby E
ASI Output

Notes:

1. Also known as H.264 and MPEG-4 Part 10.

