Electra™ 5400

MPEG-4 AVC Standard Definition Multi-Service Encoder

HIGHLIGHTS

- Ultra-low bit-rate encoding
- Advanced MPEG-4 AVC MP@L3 video compression
- Up to 4 channels per chassis
- Low resolution channels for applications such as picture-in-picture (PiP), dynamic multi-channel mosaics
- Multi-pass LookAhead constant bit-rate (CBR) or variable bit-rate (VBR) encoding
- Statmux over IP in LAN and WAN environments with DiviTrackIP™
- Single slice encoding
- 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
- Support for SCTE104 DPI triggering
- 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

The high performance Electra® 5400 encoder is Harmonic's third generation MPEG-4 AVC standard definition encoder and the industry's first product based on ASIC processing technology. 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.

The Electra 5400 allows operators to quickly and efficiently launch SD services while providing the highest quality viewing experience. Its encoding flexibility enables operators to deliver up to four simultaneous MPEG-4 AVC channels in high and low resolution formats, increasing revenue per program and enhancing customer satisfaction by flexibly delivering multiple services to any device.

With its standard IP interfaces, the Electra 5400 can be easily incorporated in 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 5400 is the most advanced encoding platform for IPTV, satellite, cable or terrestrial applications available today.

BENEFITS OF THE DIVICOM ELECTRA 5400

- **Outstanding performance with system-on-chip compression engine –** Leveraging the increased processing power of a cutting edge MPEG-4 AVC compression ASIC, the Electra 5400 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 5400 presents a dramatic improvement in MPEG-4 AVC video quality.
- **Density –** By offering up to four SD channels and multiple low resolution channels per 1-RU device, operators can provide multiple, feature-rich services utilizing less space than required in a traditional headend.
- **Low-resolution outputs –** The Electra 5400 is capable of simultaneously delivering low resolution channels for new applications such as picture-in-picture (PiP) and dynamic mosaics within a given bandwidth, without compromising video quality.
- **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.
- **Advanced audio support –** The system supports a wide spectrum of audio formats including AAC, HE-AAC, Dolby and MPEG1-L2, as well as Dolby E to AC-3 transcoding.

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VIDEO SPECIFICATIONS

Video Compression	MPEG-4 AVC[1] MP@L3
Video Processing	LookAhead multi-pass processing
Video Input Filtering	Impulse noise reduction Motion compensated temporal filter Non-linear spatial filter Noise level estimation
Aspect Ratios	4:3 and 16:9
Vertical Resolutions	576 (PAL), 480 (NTSC)
Horizontal Resolutions	720, 704, 640, 544, 528, 480, 352
Intermediate Resolution	352x240, 320x240 (29.97fps only)
Ancillary Low Resolution[2]	96x96, 128x96, 192x192
Encoding Bit-Rate	0.3 to 15 Mbps (4:2:0 VBR), 0.3 to 15 (CBR), 0.3 to 15 (capped VBR)[3]
VBI Support	WST (Teletext), Inverted WST, WSS, VPS, AFD, VITC
Closed Captioning	EIA-608 Line 21 (fields 1 and 2) per ATSC CS/TSG-659r2
Digital Program Insertion (DPI)	SCTE35 insertion via SCTE104 triggers

AUDIO SPECIFICATIONS

Number of Channels	Default: up to 3 stereo pairs or 1 multi-channel audio per video service Option: up to 5 audio encoding modules each supporting 2 stereo pairs
Audio Formats	MPEG Layer II, Dolby Digital (AC-3), AAC[2], HE AAC[2] native encoding
Analog Digitizing Resolution	24 bits
Analog Input Level	-18 to +4 dBu 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-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
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 component 625-line or 525-line
Audio Inputs	Embedded audio, Digital (AES3/EBU or S/PDIF), Analog (balanced/unbalanced)
Video and Audio Outputs	MPEG-2 transport stream over UDP/IP (redundant 100/1000 BaseT connectors) ProMPEG FEC[3] IGMP V3 support[3]

SYSTEM MANAGEMENT

NMX Digital Service Manager
Web-based GUI

POWER

Input Voltage Range	85-132 VAC or 170-264 VAC 42-60 VDC
Line Frequency	47-63 Hz
Typical Consumption	60 W per channel

ENVIRONMENTAL

Cooling	9 fans; air flow front to side
Operating Temperature Range	0° to +50° C +32° to +122° F
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.

2. Optional firmware license.

3. Software option

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