

Electra™ 9200 Encoder

AUDIO INPUT MODULES



The level of complexity in traditional headends is increasing significantly. With the ever-expanding rollout of new digital services and the acceleration of HD and MPEG-4 AVC deployments, the quantity of multiformat video and audio content that arrives from multiple sources is also on the rise. Baseband architectures struggle to handle this transition. In addition, cable, satellite and telco operators that embrace video-over-IP technology require a solution that enables them to seamlessly process audio sources that match the target output format.

The Harmonic Electra™ 9200 universal broadcast and multiscreen encoder addresses these challenges with high-density audio compression capabilities and a versatile family of optional audio input modules.

Electra Audio Functionality

The Electra 9200 encoder supports embedded audio and natively compresses up to three stereo pairs of MPEG-1 Layer II as standard. Dolby® Digital (AC-3) 2.0 and 5.1, Dolby Digital Plus (E-AC-3) and Dolby E audio can be passed through. Encoding of AC-3 2.0 and 5.1, and AAC/HE-AAC 2.0 v1, v2 and 5.1 v1 audio is available by firmware license.

Two plug-in modules are available to extend the Electra 9200 platform's audio encoding capabilities:

IOM-RAC2

The IOM-RAC2 module encodes up to 16 audio streams of AC-3 and E-AC-3 audio, and decodes Dolby E, AC-3, E-AC-3, AAC/HE-AAC and MPEG-1 Layer II audio. The module also enables simultaneous transcoding of Dolby E to AC-3 2.0 and 5.1. Dolby E, AC-3, E-AC-3 and MPEG-1 Layer II audio can be passed through.

AHC-RAC

The AHC-RAC module accepts AES3 audio input. AC-3 2.0 and 5.1, E-AC-3 2.0 and 5.1, and Dolby E audio can be passed through. Encoding of three stereo pairs of AC-3, AAC/HE-AAC and MPEG-1 Layer II audio is available by firmware license.

HIGHLIGHTS

IOM-RAC2

- Encoding, decoding and transcoding of up to 16 audio services
- MPEG-1 Layer II, AC-3, E-AC-3 and AAC/HE-AAC encoding
- MPEG-1 Layer II, AC-3, E-AC-3 and AAC/HE-AAC and Dolby E decoding

- MPEG-1 Layer II, AC-3, E-AC-3, AAC/HE-AAC and Dolby E pass-through
- Embedded audio support
- Audio level adjustment

AHC-RAC

- Encoding and decoding of up to three pairs

- MPEG-1 Layer II, AC-3 and AAC/HE-AAC encoding
- AC-3 decoding
- AC-3, E-AC-3 and Dolby E pass-through
- AES & embedded audio support

Solution Benefits

Enhanced Performance

With audio encoding and transcoding integrated into the Electra 9200 chassis, and a choice of AES or embedded inputs, encoder density is increased, signal management is simplified, and operating costs are reduced.

No-Compromise Encoding and Transcoding

The Electra 9200 platform delivers the highest audio encoding quality for MPEG-1 Layer II, AC-3, E-AC-3, AAC and HE-AAC audio. The ability to transcode from all decoding formats to all encoding formats with no compromise on channel density results in more efficient workflows.

Wide-Ranging Audio Services

In addition to stereo and multichannel audio encoding, the Electra 9200 supports pass-through of all major audio formats, including MPEG-1 Layer II, AC-3, E-AC-3, Dolby E, AAC and HE-AAC. The IOM-RAC2 module adds Jünger Level Magic™ audio-level adjustment, which automatically eliminates audio-level changes both within a channel (such as during commercial breaks) and when switching from one channel to another.

Efficient Delivery of New Services

The Electra 9200 encoder is well-suited for both new and transitioning headend architectures. By offering AC-3 transcoding, Electra 9200 encoders greatly simplify the turnaround of pre-compressed feeds. Operators can also take a given input feed and multicast it in different formats, or pair it with MPEG-2 and AVC audio for new service introductions to tiered set-top boxes.

Technical Advantages

High-Density Audio Processing

The IOM-RAC2 module enables the Electra 9200 to encode up to eight 5.1 channels and eight 2.0 channels, reducing box count and wiring, and simplifying the headend.

Simplified Management

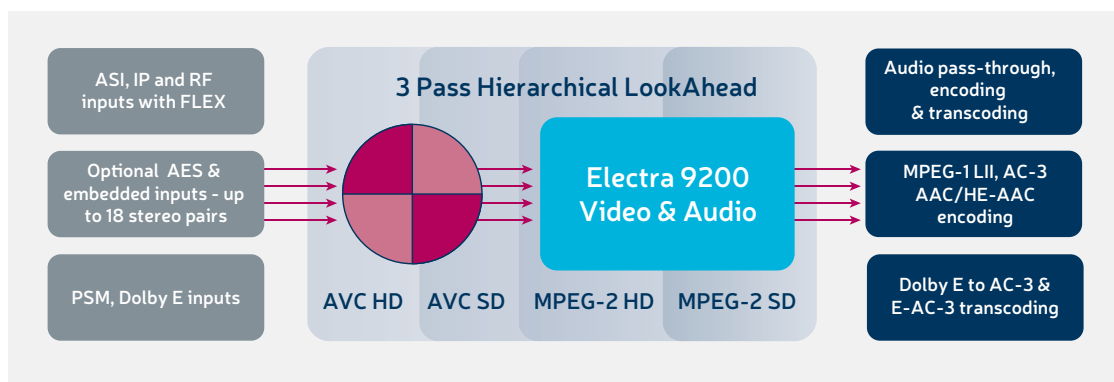
Integrating audio encoding functionality into the Electra 9200 chassis — including pass-through, compression and transcoding — results in reduced system complexity, fewer single points of failure, and lower OPEX and CAPEX.

All-IP Infrastructure

IP input is a must-have capability for encoders. The optional Harmonic FLEX® dual video and audio decoder expands the IP capability of the Electra 9200 platform by providing native IP input. The result is a more scalable and lower-cost transition to IP-based service.

Network Management

Harmonic's NMX™ Digital Service Manager works with Electra 9200 encoders to simplify mass configuring, monitoring and automated redundancy in both centralized and distributed architectures.



AUDIO COMPRESSION SUPPORT FOR ELECTRA 9200

	On-Board (Standard)	AHC-RAC (Option)	IOM-RAC2 (Option)
Features			
Embedded Audio	Supported	Supported	Supported
External Digital Audio (AES3, BNC)	N/A	Supported	N/A
Max Number of Pairs	Three (from same group)	Three (from same group)	16
Max Number of 2.0 Encodes	Three	Three	16
Max Number of 5.1 Encodes	One	One	Eight
Dolby Metadata	VANC	Serial or VANC	Embedded/VANC
Aggregate Max Encodes	Three 2.0 or one 5.1 (same codec)	Three 2.0 or one 5.1 (same codec)	Eight 2.0 plus eight 5.1 (varied codecs)
Pass-Through			
MPEG-1 Layer II	N/A	N/A	Supported (TS input over IP/8VSB/ASI only)
AC-3 (2.0/5.1)	Supported	Supported	Supported
E-AC-3	Supported	Supported	Supported
Dolby E	SDI source only	SDI source only	SDI source only
Encoding Codecs			
Codec Limitations	One codec/adaptor	One codec/adaptor	N/A
MPEG-1 Layer II	Three stereo pairs	Three stereo pairs	16 stereo pairs
E-AC-3 2.0	N/A	N/A	16 stereo pairs
E-AC-3 5.1	N/A	N/A	Eight (plus eight stereo pairs)
AC-3 2.0	Three stereo pairs	Three stereo pairs	16 stereo pairs
AC-3 5.1	One	One	Eight (plus eight stereo pairs)
AAC/HE-AAC 2.0 (v1, v2)	Three stereo pairs	Three stereo pairs	16 stereo pairs
AAC/HE-AAC 5.1	One	One	Eight (plus eight stereo pairs)
Decoding Codecs			
Codec Limitations	One codec/adaptor	One codec/adaptor	N/A
MPEG-1 Layer II	N/A	N/A	16 pairs (IP/8VSB/ASI source only)
AC-3 2.0	One stereo pair	One stereo pair	16 stereo pairs
AC-3 5.1	One (transcode to a stereo pair only)	One (transcode to a stereo pair only)	Eight (plus eight stereo pairs)
E-AC-3 2.0	N/A	N/A	16 stereo pairs
E-AC-3 5.1	N/A	N/A	Eight (plus eight stereo pairs)
AAC/HE-AAC 2.0 (v1, v2)	N/A	N/A	16 stereo pairs (IP/8VSB/ASI source only)
AAC/HE-AAC 5.1	N/A	N/A	Eight (plus eight stereo pairs) (IP/8VSB/ASI source only)
Dolby E	N/A	N/A	Eight (SDI source only)

MPEG-1 LAYER II AUDIO ENCODING

Encoding Bitrate	
Mono	32-192 kbps
Stereo	64-384 kbps
Sampling Frequencies	48 kHz for all inputs, or 32 kHz or 44.1 kHz for external digital

AC-3 AUDIO ENCODING

Encoding Bitrate	
Mono	56-640 kbps
Stereo	96-640 kbps
5.1	224-640 kbps
Sampling Frequency	48 kHz

E-AC-3 AUDIO ENCODING

Encoding Bitrate	
Mono	64-1024 kbps
Stereo	64-1024 kbps
5.1	192-1024 kbps
Sampling Frequency	48 kHz

AAC AUDIO ENCODING

Channels	2.0 or 5.1
Encoding Bitrate	
Mono	32-192 kbps
Stereo	32-384 kbps
5.1	160-640 kbps
Sampling Frequencies	32 kHz, 44.1 kHz or 48 kHz
Encoding Constraints	MPEG-2 or AVC
Encapsulation Formats	ADTS or LATM/LOAS

HE-AAC AUDIO ENCODING

Channels	2.0 or 5.1
Encoding Bitrate	
Mono	32-64 kbps
Stereo	32-128 kbps
5.1	96-128 kbps
Sampling Frequencies	32 kHz, 44.1 kHz or 48 kHz
Encoding Constraints	MPEG-2 or AVC
Encapsulation Formats	ADTS or LATM/LOAS

AC-3/E-AC-3 PASS-THROUGH

Channels	2.0 or 5.1
Pre-encoded Bitrate	96-640 kbps
Sampling Frequency	48 kHz
Audio Delay/Advance Mode (for use with external third-party audio encoders)	-500 ms to +500 ms
Automatic Null Insertion	0-640 kbps

AAC/HE-AAC PASS-THROUGH

Channels	2.0 or 5.1
Encoding Bitrate	32-384 kbps
Sampling Frequency	48 kHz
Encapsulation Formats	ADTS only

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