

# Electra™ / Ion™ FLEX™

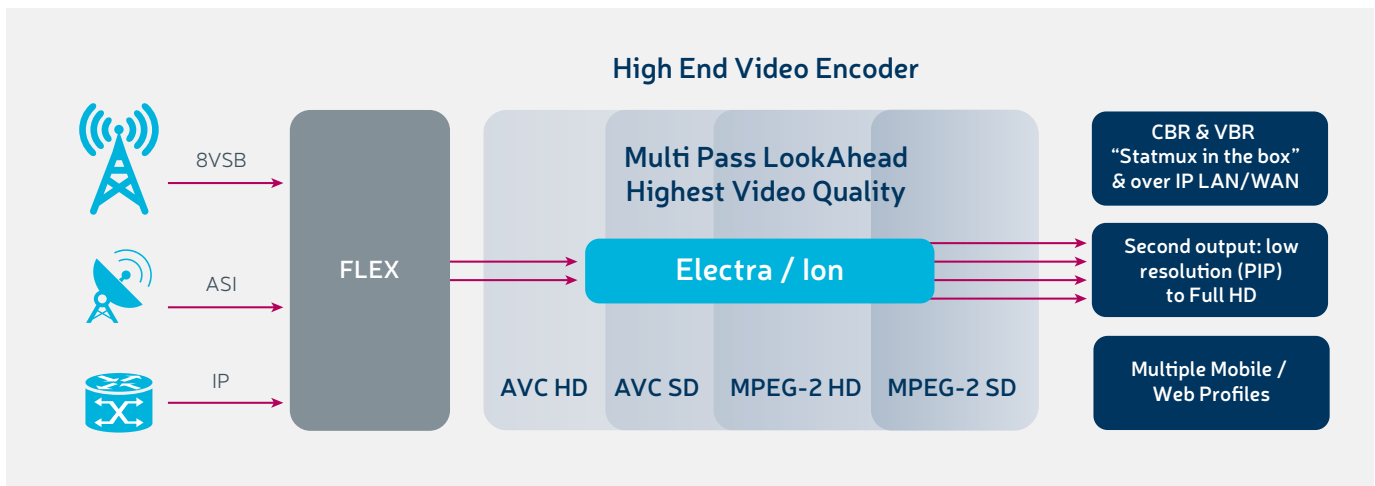
## DUAL DECODER SOLUTION

With the ever-expanding rollout of new digital services and the acceleration of HD and MPEG-4 AVC deployments, the level of complexity in traditional headends has increased significantly. Today's baseband architectures are ill-equipped to handle this transition smoothly, as content is coming from multiple sources and in many formats. In addition, cable, satellite and telco operators are embracing video-over-IP technology at a rapid pace, and are looking for a solution that can enable them to seamlessly migrate to an IP-based service. Harmonic's FLEX™ dual decoder module is a powerful solution that addresses these issues.

FLEX delivers highly flexible video and audio decoding capabilities as an option for Harmonic's Electra™ or Ion® encoder chassis. A single FLEX module is able to decode up to two (2) incoming channels, and an appropriately configured encoder can deliver up to four (4) channels in a single rack-unit (1-RU). The highly versatile FLEX decoder module will decode AVC or MPEG-2 in either standard definition (SD) or high definition (HD) 4:2:0 formats, thereby eliminating the dependency on ingress formats.

FLEX is a unique gateway designed with the flexibility to deliver pre-compressed video to any Electra or Ion encoder. FLEX supports both ASI and IP inputs, the most efficient interfaces used to route and transport pre-compressed video feeds.

By offering an IP input interface to the encoder, FLEX delivers a key technology required for the industry's continued migration to all-IP headends. This option enables operators to source content from IP networks or IP-ready RF demodulators/ descramblers. This solution greatly reduces overall system cost and complexity, supports the most common video and audio formats in use today, and was developed to meet the current and future needs of multi-service providers.



### HIGHLIGHTS

- Integrated decoding for Electra™ and Ion™ encoder product lines
- Dense and versatile, decodes up to two services per card
- Transport Stream inputs via GbE IP, ASI and 8VSB available to support DVB & ATSC applications
- Video Decoding: SD, HD MPEG-2 and AVC video; CBR or VBR
- HD to SD down-conversion
- Confidence monitoring video port
- MPEG-1 Layer II and Dolby® Digital (AC-3) Audio decoding
- Dolby® Digital AC-3, AAC, HE AAC, and MPEG-1 Layer II audio pass-through, up to 8 channels
- Level Magic™ Audio Level Control/Adjustment
- Vertical Interval Data Services, EBIF, SCTE-35, and DVB subtitles pass-through
- Controlled via NMX Digital Service Manager™ or standalone web GUI

## Solution Benefits

- **Enhanced performance**  
With decoding integrated into the Electra or Ion chassis and a choice of IP, ASI or 8VSB inputs, density is increased, management is simplified and operating costs are reduced.
- **“No-compromise” transcoding**  
Highest video and audio decoding quality combined with Harmonic’s robust and proven compression technology result in the highest re-encoding quality.
- **Wide-ranging audio services**  
FLEX supports pass through of all major audio formats, including MPEG Layer II, Dolby® Digital, AAC, and HE AAC with support for stereo and multi-channel audio. The Level Magic™ audio level control option addresses a perennial problem for service operators, enabling unattended control of audio level consistency.
- **Ideal for applications**  
FLEX is particularly well suited for new or transitioning headend architectures. The turnaround of pre-compressed feeds is now greatly simplified. Operators can take a given input feed and multicast it in both MPEG-2 and AVC formats for new service introductions to tiered set-top boxes.

## Technical advantages

- **Density**  
By decoding up to two (2) channels per card, FLEX integrated in an Electra or Ion encoder delivers up to four (4) HD or SD channels per RU Collapsing audio and video decoding functionality into the encoder reduces box count, reduces wiring and simplifies the headend.
- **Simplified management**  
Integrating decoding functionality into Harmonic’s encoder chassis with elimination of external ASI & SDI routing results in reduced system complexity, reduced single points of failure and lower OPEX and CAPEX.
- **Vertical ancillary services**  
FLEX supports the delivery of ancillary data for services such as teletext, closed captioning, DVB subtitles, EBIF and DPI.
- **Format conversions**  
Flex supports HD to SD down conversion plus the ability to decode and down mix Dolby Digital 5.1 to stereo.
- **Enables source redundancy**  
The all-IP infrastructure increases the resiliency of systems by enabling automatic failover to local or remote backup sources
- **Robust decoding capability**  
FLEX is based on robust and field proven upgradable SoC technology enabling Harmonic’s video quality enhancements.
- **Support for all-IP infrastructure**  
Harmonic was an early pioneer of IP-enabled video delivery. FLEX expands the IP capability of Harmonic’s product line by offering native IP input functionality in Harmonic’s best-in-class Electra and Ion platforms. The result is a more scalable and lower-cost transition to IP-based service. IP is the new “must have” input to the encoder.
- **Network management**  
Harmonic’s NMX Digital Service Manager™ simplifies mass configuring, monitoring and automated redundancy in both centralized and distributed architectures.

## SPECIFICATIONS

### VIDEO SPECIFICATIONS

Video Compression and bit rate (CBR/VBR) 4:2:0 encoding options	
Video Decoding (4:2:0)	MPEG-2 MP@ML, MPEG-4 AVC MP@L3, MPEG-2 MP@HL, MPEG-4 AVC HP@L4 VBR, CBR
Video Formats	480i29.97, 576i25, 720P59.94, 720P50, 1080i29.97, 1080i25
Aspect Ratios	4:3 and 16:9
The same input PID can be declared multiple times to allow FLEX to decode and reencode the same video program multiple times.	

### AUDIO DECODING SPECIFICATIONS

FLEX supports firmware licensable options for audio decoding	
Audio Formats	MPEG-1 Layer II, Dolby Digital (AC-3) 2.0 or 5.1
Operating modes	Mono, stereo, multichannel (5.1), and multichannel down-mix to stereo
<b>Decoding capacity</b>	
Dual decoder mode	Up to 4 stereo or one AC-3 5.1 and 1 stereo 5.6 to 448
Single decoder mode	Up to 8 stereo or 2 AC-3 5.1 and 2 stereo
Static level control	- 20 dB to + 20 dB
The same input PID can be declared multiple times to allow FLEX to decode and reencode the same audio program multiple times.	

### AUDIO PASS-THROUGH SPECIFICATIONS

FLEX supports firmware licensable options for audio pass-through	
Number of Channels	Up to 8 PIDs per video service
Audio Formats	MPEG Layer II, Dolby Digital (AC-3), AAC, and HE AAC

### LEVEL MAGIC™ – AUDIO LEVELING SPECIFICATIONS

FLEX supports firmware licensable options for audio level adjustment.	
<b>Audio leveling capacity</b>	
Dual decoder mode	Up to 3 stereo or one AC-3 5.1
Single decoder mode	Up to 6 stereo or 2 AC-3 5.1

### VERTICAL INTERVAL SERVICES PASS-THROUGH SPECIFICATIONS

Pass-through	EBIF, DPI (SCTE-35), Teletext, Inverted WST, WSS, VPS, AFD, VITC
Closed captioning	CEA-608 and CEA-708

### HARDWARE OPTIONS

Model Number	Description
IOM-FLEX-DHC	Optional video/audio decoding module for ION and Electra encoders. Supports up to 2 video and 2 audio services per card with firmware options.
IOM-GBE	Dual Gigabit Ethernet input module for Electra and Ion encoders
IOM-ASI	DVB-ASI input/output module for Electra and Ion encoders
IOM-8VSB	ATSC receiver input module for Electra and ION encoder

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www.digitalglue.com  
sales@digitalglue.com  
877.822.4683

### INPUT MODULE OPTIONS

<b>IP Interface (optional module)</b>	Gigabit Ethernet
IP Ports	2 independent ports
Connector	2 x SFP (copper)
Speed	1 x 1000 Mbps per port
IP Encapsulation	MPEG-2 TS over UDP/IP 1 to 7 TS/ IP
MPEG-2 TS Format	188/204 Bytes per TS packet MPTS and SPTS
Maximum Bit-Rate	80 Mbps per Socket
Addressing	Unicast and multicast
Management	IGMP, ARP, ICMP
<b>ASI Interface (optional module)</b>	Connector 4 x BNC, 75Ω
MPEG Format	188/204 Bytes per TS packet
Processing	1 MPTS/SPTS per port Up to 160 Mbps per port
<b>8VSB Interface (optional module)</b>	4x Type F connector per IEC 60169-24
Tuning	ATSC-compliant 8-VSB signal reception
Sensitivity	Channels 2 through 59
Dynamic Range	83 dBm/6 Mhz >80 dB

### OUTPUTS

Video Outputs	1 per decoded channel with video only, SDI or HD-SDI 1 additional per channel for confidence monitoring only
Connector Type	DIN 1.0-2.3 (DIN 1.0/2.3 to BNC adapters are available)

### SYSTEM MANAGEMENT

NMX Digital Service Manager	All encoder models
Web GUI control	When running in standalone mode

### POWER (AS FURNISHED BY HOST ENCODER CHASS IS)

Please refer to the hosting encoder datasheet	
Input Voltage Range	85-132 VAC or 170-264 VAC 42-60 VDC
Line Frequency	47-63 Hz
Typical Consumption	24 W per FLEX module

### ENVIRONMENTAL AND PHYSICAL

Please refer to the hosting encoder datasheet	
Compliant with RoHS Directive	2002/95/EC as amended