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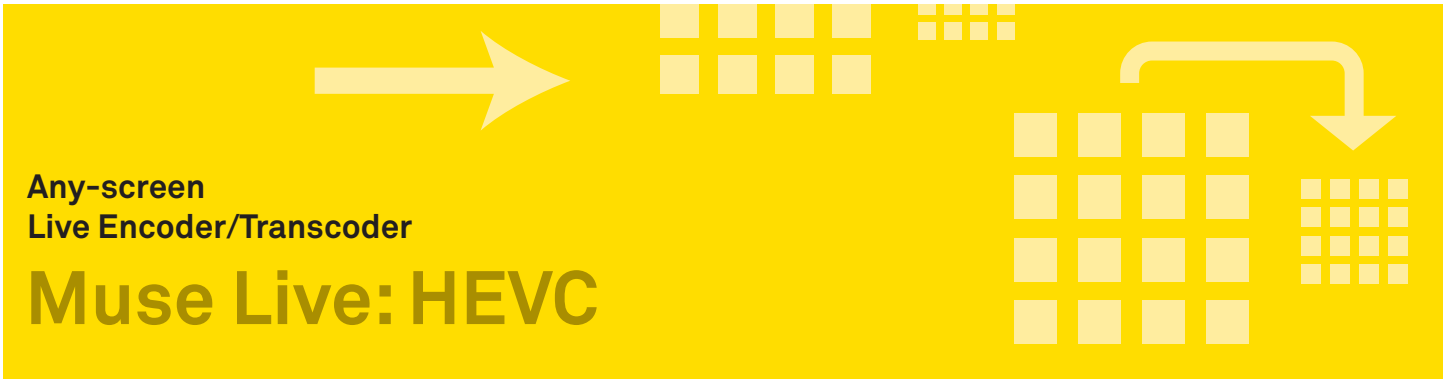


Any-screen
Live Encoder/Transcoder

Muse Live: HEVC

High-Performance HEVC Video Processing

Envivio Muse™ is a high-quality any-screen software architecture for live and on-demand video encoding/transcoding to any device. Providing an unrivaled user experience, Muse Live integrates the latest audio/video technologies, including support for HEVC (H.265) compression.

The new HEVC standard, finalized in February 2013, promises up to 50% bandwidth or quality gain. This codec is designed to optimize compression for higher resolutions including 1080p, 4K or 8K.

Benefits of deploying HEVC include:

- Increase eligibility for IPTV services
- Provide a higher quality HD experience on mobile devices using 4G/LTE networks
- Reduce CDN costs in an ABR environment
- Broadcast higher resolutions (up to 4K) using existing networks

The Envivio Muse Live HEVC encoder leverages the Envivio's team experience developing previous codec standards including MPEG-4 AVC (H.264) and MPEG-2.

Premium Quality, Enhanced Experience

The HEVC codec developed by Envivio has been tailored to provide the highest video quality on any screen, from HD to mobile resolutions for smartphones. Envivio's HEVC implementation is based on the latest HEVC standard (10.0), facilitating compatibility with multiple decoders.

Product Highlights

- HEVC main profile codec designed by Envivio
- High-quality enhancement filters: deblocking, MCTF, denoising, cross-scaling and audio loudness control
- Available on Envivio 4Caster™ or industry standard blade servers
- Baseband or compressed video source ingest via SDI, ASI or IP interfaces
- Based on widely-deployed Envivio Muse Live software: all features from Muse Live available
- Ingress and egress native IP redundancy and N+M redundancy with Envivio 4Manager™
- Continuous quality and feature enhancements via software and license upgrades

Envivio Muse Live: HEVC · Any-screen Live Encoder/Transcoder

IP-centric, Software-based Approach

Muse offers an IP-centric and IT-oriented approach to video transcoding, and also supports traditional MPEG-2/AVC set-top boxes as well as Apple iOS, Android and 3GPP smartphones, tablets, PCs with Flash or Silverlight, gaming systems and connected TVs.

Envivio Muse Live is ideal for any real-time broadcast application, including IPTV, cable, DTH, Internet and mobile.

Muse also supports advanced services such as advertisement insertion and content protection for personal devices.

Significantly improving efficiency and operations compared to architectures that call for separate headends, Muse Live is available on the Envivio 4Caster G4 appliance or industry-standard IT blade servers.

The high-performance Envivio G4 platform is designed to support HEVC tools and enable high quality, low bit-rate encoding, at up to 4K resolutions.

The flexible software architecture of Muse makes upgrades and reconfiguration of the system simple, while the IT-centric approach lowers the operational costs.

Comprehensive Feature Set

Muse provides state-of-the-art pre-processing filters: motion compensated temporal filters (MCTF), deblocking filters, advanced de-interlacing for multiple screens, adjustable resolutions to match display capabilities, aspect ratio management, and other picture adjustments. Muse also performs upscaling, downscaling, and HD-to-HD cross-scaling. In order to make the home theater experience richer, Muse checks and adjusts the incoming sound level and carries up to eight audio tracks per channel.

Muse enables rich end-user experiences with support for picture-in-picture, alternative audio languages, closed captions, DVB-Subtitles and DVB-Teletext. These functionalities are available not only for broadcast TV services, but for any device supporting the related metadata.

Muse is designed and built for top broadcast quality with 24x7 operations. Muse provides error statistics (ETR 290), video quality monitoring, failover mechanisms and automatic N+M failover protection with Envivio 4Manager™.

Muse supports a variety of advanced features on both traditional TV and mobile devices that enable operators to increase revenue and control content distribution. Mechanisms for channel branding, ad insertion, content blackout and image insertion on input loss are designed and available directly in the encoder.

Integrated in the Video Ecosystem

Envivio developed its HEVC codec in partnership with hardware and software decoder/player manufacturers.

Envivio worked with VisualOn and HHI/Franhauffer to provide an HEVC ecosystem for computers and mobile devices. Muse processes the audio/video stream and the players decode it on computers (HHI/Franhauffer) or tablets and smartphones (VisualOn).

The same workflow can be achieved on set-top boxes using Broadcom chipsets.

Advanced HEVC Solution

Envivio is continuously working to further enhance the video quality provided by its codecs. The HEVC implementation will integrate the full set of tools provided by the HEVC standard as the HEVC ecosystem grows. These improvements will be provided through frequent software upgrades, thanks to Envivio Muse Live's flexible software-based design.

Envivio Muse Live: HEVC · Any-screen Live Encoder/Transcoder

	Multi-screen	Cable, IPTV, Broadcast
Input		
Baseband Input	Support for HD/SD-SDI or Analog input	
Compressed Input	**Type**: ASI, IP (IGMPv3-based Redundancy)	
	Protocol: MPEG-2 TS (MPTS & SPTS) up to 60 Mbps over IP or ASI input (check platform for compatibility)	
	Codec: MPEG-2, H.264 – MPEG-1 LII, Dolby Digital (AC-3), Dolby Digital Plus (E-AC3), AAC, HE-AAC v1 and v2	
Pre-Processing		
Aspect Ratio	WSS, AFD, Video index	
Metadata and VBI	SCTE 104(1), SCTE-35, IA 608/708 Closed Caption, DVB Teletext, DVB-VBI, SCTE 27(1), VITC	
Image Settings	Brightness, Contrast, Saturation, Hue, Gamma, Temperature	
Enhancement Filters	**Video**: De-interlacing, Cropping, Letter boxing, Stretching, SD and HD Cross-scaling, 3:2 Pull down, MCTF (1), Deblocking filter (1), Denoising filter(1) and Smart Sharpening(1)	
	Audio: Automatic loudness control (A/85), Audio gain adjustment, Mute	
Image Overlay	Scheduled image insertion, Image insertion on input loss, Logo insertion, Black-out management	
Video Encoding		
Video Codec	HEVC Extreme Main profile H.264 Extreme/Main/High profile	HEVC Extreme Main profile H.264 Extreme/Main/High profile
Rate Control	CBR/Capped VBR/Available bit rate	CBR/Capped VBR/Available bit rate
Data Rate	From 20 kbps to 5 Mbps (2)	From 128 kbps to 20 Mbps (2)
Resolutions	Ranging from 80x64 to 1280x720 (720p)	576i and 480i @ 25/29.97/30 fps 720p @ 50/59.94/60 fps
Multistream Output	Common encoding and Adaptive Bit Rate (ABR)	PiP(1): 96x96, 128x96, 192x192
Audio Encoding		
Audio Channels per Service	Up to 4 stereo pairs	Up to 8 stereo pairs
Audio Encoding	MPEG-4/MPEG-2 AAC, HE-AAC v1 and v2, AMR-NB, AMR-WB, Windows Media Audio/Audio Pro	MPEG-4/MPEG-2 AAC, HE-AAC v1 and v2, MPEG 1 Layer II
Pass-Through	MPEG 1 LII, AC-3, Dolby Digital Plus (E-AC3) 5.1-ch or stereo(3)	MPEG 1 LII, AC-3, Dolby Digital Plus (E-AC3) 5.1-ch or stereo(3)
Data Rate	From 4.75 kbps to 320 kbps	From 32 kbps to 384 kbps
Post Processing		
Metadata	**Thumbnail generation** for HLS	-
	Subtitles pass-through and translation: EIA 608/708 Closed Caption, DVB Teletext, DVB Subtitiles, SCTE 27	**Subtitles**: EIA 608/708 Closed Caption, DVB Teletext, DVB Subtitiles, SCTE 27
	Ad insertion: EBIF pass-through, SCTE 35 pass-through and translation	**Ad insertion**: SCTE 35 pass-through
	VITC Timecode: available in all formats	**VITC Timecode**: Available in all formats
Encryption (1)	**AES Encryption:** compliant with HLS, PlayReady, Windows Media DRM, Internal or external Key generation with Interface with major DRM and CAS vendors	–
Monitoring and Control		
Control Interface	Up to 2 IP ports, monitoring and control ports (primary and spare)	
Control and System Protocols	SOAP, HTTP, NTP, FTP, IGMP v2/v3, SNMP v2	
Scalability	Automated node redundancy with Envivio 4Manager NMS	
Output		
Output Type	Redundant IP outputs	Redundant IP outputs
Output Format	MPEG-2 ATS format (MPEG-2 TS multirate)	DVB, ATSC TOT/TDT, SDT generation
Compatible Hardware Platforms		
Envivio Platform	Envivio 4Caster G4	
HP System	Guaranteed performance on: HP ProLiant BL460c Server with two X5670 Intel CPUs (2.93 GHz), 48 GB RAM (6 x 8 GB), 500 GB HDD (7200 rpm), operating system: Windows Server 2008 R2 SP1 Enterprise Edition (Full specifications available at www.hp.com)	

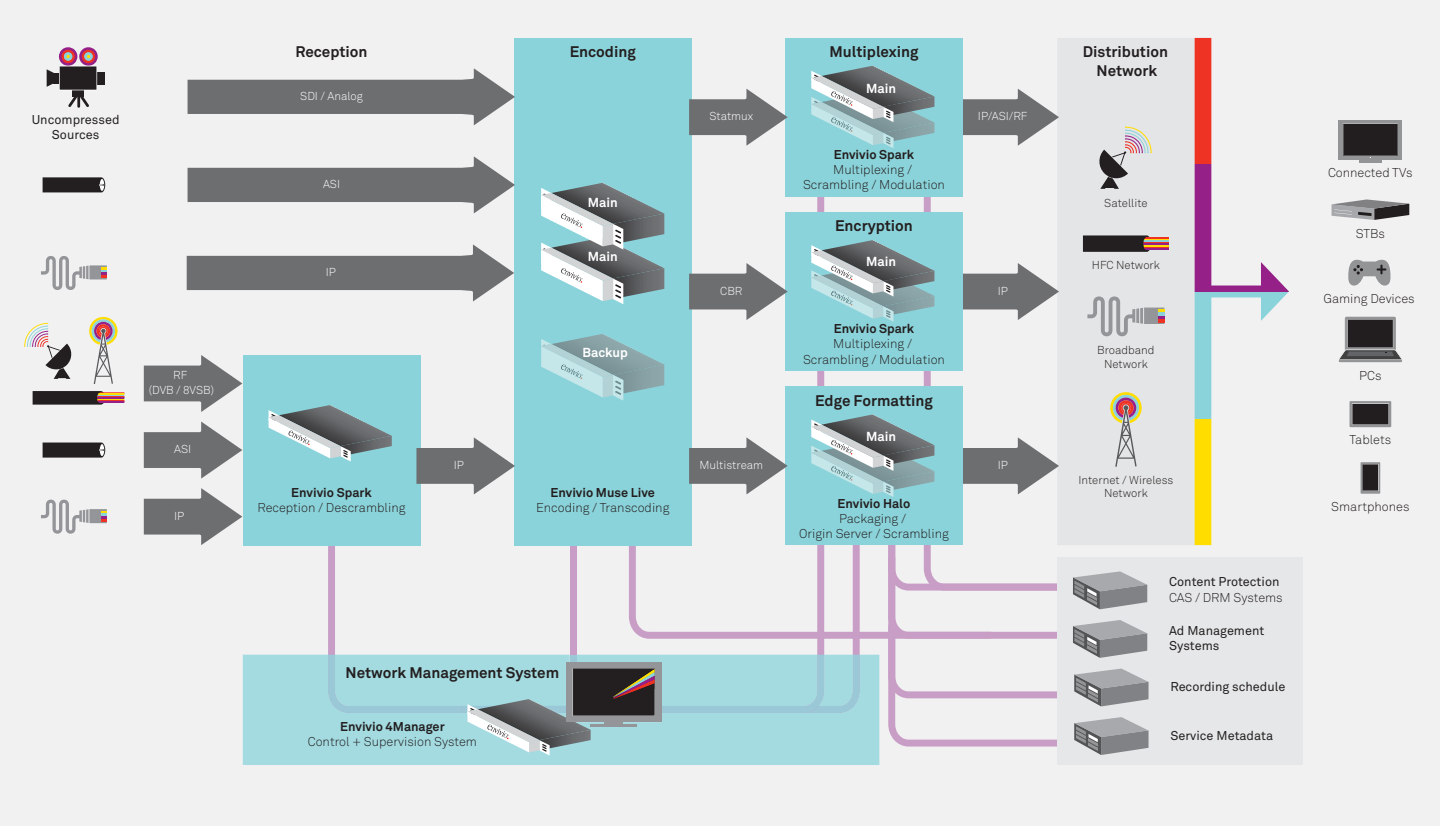
(1) Option (2) Depends on codec and resolution (3) TS outputs only

DOLBY DIGITAL PLUS PRO ENCODER

Envivio Muse Live: HEVC · Any-Screen Live Encoder/Transcoder

Live Encoding and Processing

Envivio Muse Live is a key element of the Envivio multi-screen headend. This solution is fully integrated, supporting all screens simultaneously. The underlying Intel-based Envivio encoding/transcoding platforms extend easily to distribute any combination of TV, mobile and broadband services, ingesting a large number of channels from any sources and encoding/transcoding them for live, near-live and on-demand delivery. The Envivio 4Manager system eliminates traditional silo views and management of services, replacing it with a single holistic view of the entire service.



Envivio®

TV without boundaries.

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