

# Spin Digital Live Encoder

Real-time VVC and HEVC software encoder optimized for high-end live applications in UHD broadcasting, Internet streaming, and immersive media.

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## Product Highlights

- State-of-the-art CPU-based HEVC and VVC encoder
  - Real-time encoding: 4Kp60/120, 8Kp60/120, 12Kp60
  - Higher compression efficiency than competing software and hardware encoders
  - High-efficiency and low-latency encoding modes
  - State-of-the-art rate control and perceptual coding
  - SDI and IP input capture
  - Contribution-to-distribution live transcoding
  - Low-latency streaming: UDP, RTP, SRT, RIST, Zixi
  - Adaptive streaming: HLS, DASH
  - Next Generation Audio (NGA): MPEG-H Audi
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## SPIN ENC LIVE

Complete application for live video encoding:

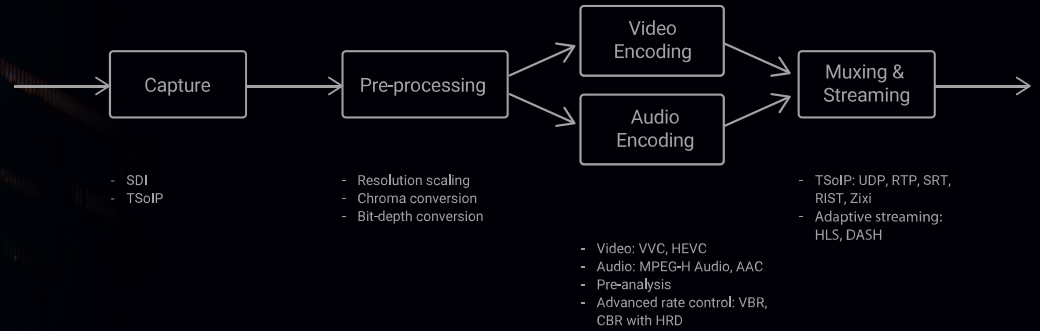
Live SDI and IP input capture

Real-time preprocessing filters

HEVC and VVC video encoding

AAC and MPEG-H audio encoding

TS-over-IP and adaptive streaming



## USE CASES

High-end 4K/8K UHD live streaming and broadcasting:

High-quality and low-bitrate live 4K/8K encoding

Low-latency contribution encoding:

4:2:2 high-bitrate output format

Live encoding with low delay

Contribution-to-distribution live transcoding:

Live IP capture, decoding, and encoding on a single system

4:2:2 and 4:2:0 formats

HEVC and VVC codecs

Adaptive bitrate (ABR) streaming over HTTP:

Closed GOP coding: HEVC, VVC

Open GOP coding: VVC

Immersive live VR:

8K/12K video with 3D audio

Live stream recording (live to file)

## LIVE VVC ENCODER



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Support for the VVC standard: Main 10 profile

Resolutions (pixels): 1920x1080, 3840x2160, 7680x4320, custom

Frame rates (fps): 23.98, 24, 25, 29.97, 30, 50, 59.94, 60, 100, 119.88, 120

Color format: 4:2:0

Bit depths: 8-, 10-bit

Color spaces: BT.601, BT.709, DCI-P3, BT.2020

HDR support: ST2084 transfer function (PQ), ST2086 HDR metadata, HLG

Coding configurations:

Intra-only, random-access, low-delay, chunk-based

Hierarchical GOP sizes: 1, 2, 4, 8, 16, 32 frames

Presets: slower, slow, balanced, fast, faster

End-to-end latency:

High-efficiency mode: 2917 ms + network latency

Low-delay mode: 1000 ms + network latency

Rate control:

Broadcast-level CBR

Constrained VBR

Perceptual VBR

Perceptual quality control

Quality optimizations:

Perceptually optimized encoding mode

Motion-compensated temporal filter for noise reduction

Screen Content Coding (SCC)

HTTP streaming with open GOP

Real-time operation mode

Timecode SEI insertion

Highly optimized for recent CPUs:

SIMD processing: SSE4.1, AVX2, AVX-512, VNNI

Scalable multithreading: wavefront, subpictures, frame parallelism, pipelining

Memory optimizations

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## LIVE HEVC ENCODER

Support for the HEVC standard:

Main and Main 10 profiles

Range Extensions (HEVCv2) profiles

ARIB STD-B32 version 3.9 (8K with 4 slices)

Resolutions (pixels): 1920x1080, 3840x2160, 7680x4320, custom

Frame rates (fps): 23.98, 24, 25, 29.97, 30, 50, 59.94, 60, 100, 119.88, 120

Color formats: 4:2:0, 4:2:2

Bit depths: 8-, 10-bit

Color spaces: BT.601, BT.709, DCI-P3, BT.2020

HDR support: ST2084 transfer function (PQ), ST2086 HDR metadata, HLG

Coding configurations:

Intra-only, random-access, low-delay, chunk-based

Hierarchical GOP sizes: 1, 2, 4, 8, 16, 32 frames

Presets: slower, slow, balanced, fast, faster

End-to-end latency:

High-efficiency mode: 2884 ms + network latency

Low-delay mode: 650 ms + network latency

Rate control:

Broadcast-level CBR

Constrained VBR

Perceptual VBR

Perceptual quality control

Quality optimizations:

Perceptually optimized encoding mode

Motion-compensated temporal filter for noise reduction

Real-time operation mode

Timecode SEI insertion

Highly optimized for recent CPUs:

SIMD processing: SSE4.1, AVX2, AVX512, VNNI

Scalable multithreading: Wavefront, frame parallelism, pipelining

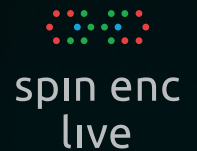
Memory optimizations

## VIDEO PREPROCESSING FILTERS

Scaling, format and color conversion, cropping/padding, overlays

Automatic filter chain generation

High-performance CPU implementation: real-time 8K processing



## AUDIO CODING

Codecs: AAC, MPEG-H Audio

Channel formats:

AAC: 2.0, 5.1, 7.1, 22.2

MPEG-H Audio: baseline profile up to level 4

## INPUT INTERFACE

Live SDI capture:

4K up to 120 Hz, 8K up to 60 Hz

3G-SDI, 6G-SDI, 12G-SDI

Multi-channel tiled capture for single large surfaces:

Flexible input layouts

Example: 15360x2160 (4x1 4K) pixels over a 4x12G-SDI interface

Simultaneous multiple video link capture:

Multiple video channels to be captured simultaneously

Allow for frame-synchronized encoding and playback

Live HDMI capture: 4K up to 60 Hz

Live TS-over-IP capture:

Transport formats: UDP, RTP, SRT, RIST, Zixi

Video codecs: HEVC, VVC

File input: YUV (video), PCM (audio)

## OUTPUT INTERFACE

TS-over-IP streaming:

Transport formats: UDP, RTP with optional FEC, SRT, RIST, Zixi

Video codecs: HEVC, VVC

Adaptive streaming over HTTP:

HLS, DASH

MPEG-2 TS, fMP4

Multi-resolution encoding and streaming

## CLOUD STREAMING AND DELIVERY

TS-over-IP streaming: compatible with AWS MediaConnect

Adaptive streaming: AWS S3, AWS Elemental MediaStore, Cloudfront

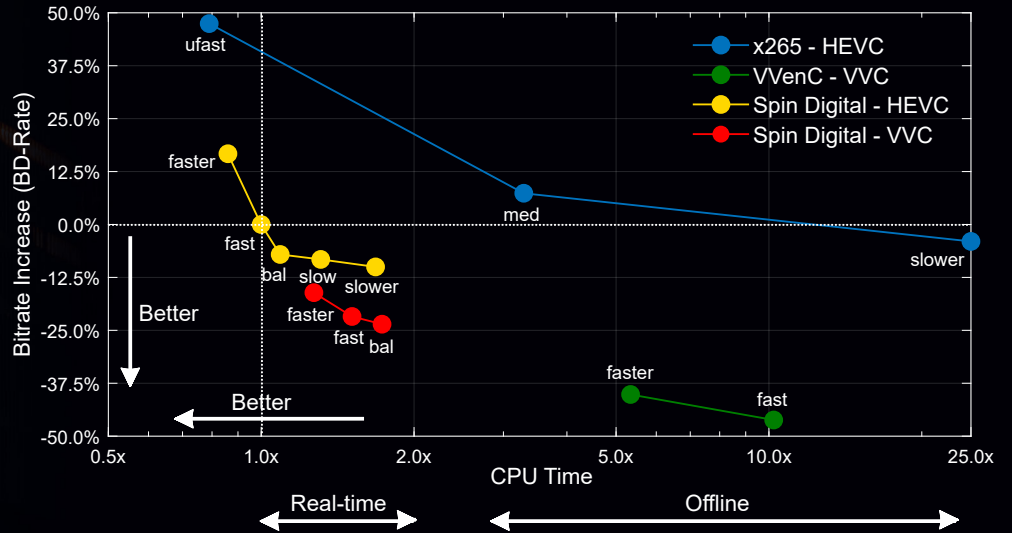
# COMPRESSION AND PERFORMANCE FOR REAL-TIME 4K AND 8K

## Key performance indicators:

Highest compression efficiency under real-time conditions

Highest encoding performance allowing high-end applications such as 8Kp60

## Bitrate increase for the same quality (PSNR) and single-threaded CPU time relative to Spin Digital HEVC (fast):



Encoder versions: Spin Enc Live v2.1, x265 v3.5, VVenC v1.9.0

## Real-time performance:

	Spin Digital HEVC	Spin Digital VVC
4Kp60 4:2:0 10-bit	✓	✓
4Kp120 4:2:0 10-bit	✓	✓
8Kp60 4:2:0 10-bit	✓	✓
8Kp60, 4Kp60, 2Kp60 (ABR)	✓	✓
8Kp60 4:2:2 10-bit	✓	x
8Kp120 4:2:0 10-bit*	✓	x
12Kp60 4:2:0 10-bit*	✓	x

\* Preliminary

## RECOMMENDED PLATFORMS FOR VVC ENCODING



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Use case	Format	Max bitrate	Platform
4K distribution	4Kp60 4:2:0 10-bit	30 Mbps	CPU: 2x Intel Xeon Gold 6330 (2x 28 cores) Memory: 128 GB (16x 8 GB, DDR4-2933)
8K distribution - entry level	8Kp60 4:2:0 10-bit	40 Mbps	CPU: 2x Intel Xeon Platinum 8480+ (2x 56 cores) Memory: 512 GB (16x 32 GB, DDR5-4800)
8K distribution - broadcast	8Kp60 4:2:0 10-bit	100 Mbps	CPU: 2x AMD EPYC 9654 (2x 96 cores) Memory: 384 GB (24x 16 GB, DDR5-4800) or CPU: 4x Intel Xeon 6480H (4x 32 cores) Memory: 512 GB (32x 16 GB, DDR5-4800)

## RECOMMENDED PLATFORMS FOR HEVC ENCODING

Use case	Format	Max bitrate	Platform
4K distribution	4Kp60 4:2:0 10-bit	80 Mbps	CPU: Intel Xeon Gold 6312U (24 cores) Memory: 64 GB (8x 8 GB, DDR4-3200)
4K contribution	4Kp60 4:2:2 10-bit	100 Mbps	CPU: Intel Xeon Gold 6330 (28 cores) Memory: 64 GB (8x 8 GB, DDR4-2933)
4K HFR	4Kp120 4:2:0 10-bit	100 Mbps	CPU: 2x Intel Xeon Gold 6354 (2x 18 cores) Memory: 128 GB (16x 8 GB, DDR4-3200)
8K distribution	8Kp60 4:2:0 10-bit	120 Mbps	CPU: 2x Intel Xeon Platinum 8368 (2x 38 cores) Memory: 128 GB (16x 8 GB, DDR4-3200)
8K contribution	8Kp60 4:2:2 10-bit	200 Mbps	CPU: 2x Intel Xeon Platinum 8480+ (2x 56 cores) Memory: 512 GB (16x 16 GB, DDR-5 4800)

## ENCODER PACKAGE

Live encoder software with web-based graphical user interface

Product documentation

## PLATFORM SUPPORT

OS: Red Hat Linux 8/9, Ubuntu Linux 20.04/22.04

CPU: X86\_64. SIMD instructions: SSE 4.1, AVX2, AVX512, VNNI

SDI: AJA Kona 5, AJA Corvid 44/88, Blackmagic DeckLink

HDMI: Blackmagic DeckLink

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