

Spin Digital SDK

Optimized video and audio encoding, decoding, processing, and rendering libraries that simplify the creation of innovative and demanding media applications.

Product Highlights

- Powerful and efficient API for Windows and Linux
 - Highly optimized CPU-based codecs
 - Real-time HEVC and VVC encoding and decoding
 - Flexible I/O for GPU and SDI devices
 - Video/image processing filters
 - HTTP and TS-over-IP streaming: HLS, DASH, UDP, RTP, SRT, RIST, Zixi
 - Screencasting and live transcoding
 - Extensive audio device support: WASAPI, SDI, ASIO
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SPIN SDK OVERVIEW

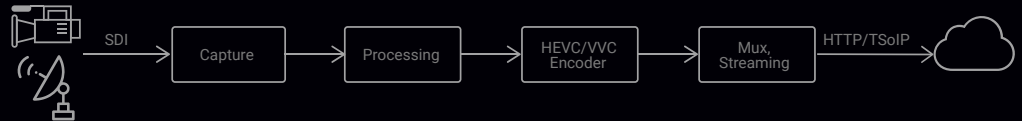
Spin SDK facilitates the creation of high-end media applications that require high-performance encoding, decoding, rendering, processing, SDI capture or streaming. All these components can be easily connected to each other using an optimized media framework. Spin SDK codecs and processing modules have been extensively optimized in order to achieve the maximum possible performance.

USE CASES

High-end Live Encoders

The core component of this use case is the HEVC and VVC encoding library, which is capable of real-time compression of videos in UHD resolutions, including 4K and 8K, and also in custom resolutions.

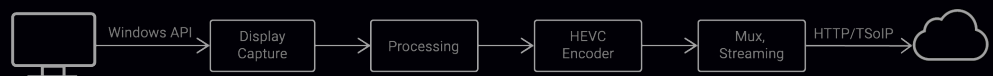
The I/O capture module receives the SDI live signal and sends it to the video and audio encoders. The resulting streams are multiplexed and sent out either over TSolP, HTTP, or both simultaneously. Optionally, the input video signal can be processed before compression in order to make changes to the resolution, transfer function, or color space, among other available filters.



8K Live Screencasting

The advanced I/O capture module also allows Windows desktops to be acquired from 8K screens. This feature enables ultra-high quality screencasting services for e-learning, remote diagnosis and engineering, among others.

Audiovisual content from the Windows desktop is captured, encoded by the HEVC real-time encoder, and the final stream is live casted to the target audiences over the Internet. All steps are performed within a single workstation or server reducing costs and improving usability.



8K Cloud Transcoding

Spin Digital's high-performance codec allows 8K video transcoding in real-time while guaranteeing the quality and compression levels required by broadcast and VoD services.

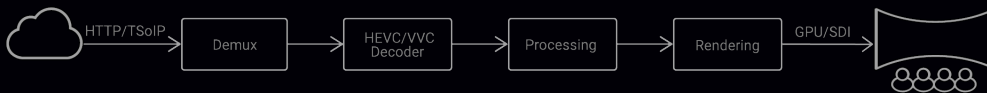
An 8K live contribution stream is decoded and then re-encoded in HEVC or VVC to send out the distribution stream over the Internet. For Adaptive Bit Rate (ABR) streaming applications, several encoding instances can be launched in parallel to generate ladders with lower qualities and resolutions.



Immersive Media Players

With its high-performance CPU-based HEVC and VVC decoders supporting very high resolutions, the SDK enables high-quality media playback in large-screen immersive environments (domes, theaters, venues, video walls) or simply on 8K TVs.

The HEVC or VVC stream coming from the service provider (or simply an HEVC or VVC file) is decoded and rendered to send out the signal via GPU or SDI. Pixel-based operations such as resolution scaling or tone and gamut mapping can also be performed on the decoded video.



A vertical photograph of a city at night, showing illuminated buildings and a street with traffic lights and cars. The image is positioned on the left side of the page, serving as a background for the text.

SPINENC: OPTIMIZED VIDEO ENCODING LIBRARY

Optimized CPU-based software encoders: HEVC, VVC

High compression efficiency and high-performance implementation:

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

Scalable multithreading: wavefront, frame parallel, pipelining

Memory optimizations

State-of-the-art rate control: broadcast-level CBR, constrained VBR

Perceptually optimized encoding mode

High-efficiency and low-latency configurations

Real-time operation mode

Timecode SEI insertion

Frame encoding API

VVC/H.266 ENCODER

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: ST 2084 transfer function (PQ), ST 2086 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

HEVC/H.265 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, 4:4:4, RGB

Bit depths: 8-, 10-, 12-bit

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

HDR support: ST 2084 transfer function (PQ), ST 2086 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

SPINDEC: OPTIMIZED VIDEO DECODING LIBRARY

Optimized CPU-based software decoders: HEVC, VVC

High-performance implementation:

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

Multithreading: wavefront, frame parallel, decoupled frame parallel

Memory optimized:

Efficient pixel formats

Optimized caching, prefetching, streaming

External picture interface

On-the-fly compression to BC4 GPU texture format

VVC/H.266 DECODER

Support for the VVC standard:

Main 10 profile

Multilayer 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

Reference Picture Resampling (RPR):

Spatial scalability

Resolution switching in HTTP streaming with open GOP

Scaling window: zoom in, zoom out

Post-processing sharpening filter for spatial scalable streams

HEVC/H.265 DECODER

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, 15360x8640, 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, 4:4:4, RGB

Bit depths: 8-, 10-, 12-bit

Error resilience for non-compliant inputs



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SPINRENDER: HIGH-PERFORMANCE VIDEO RENDER ENGINE

GPU and SDI video rendering:

GPU rendering based on DirectX 12

CPU rendering for professional SDI output (AJA, Blackmagic)

Color spaces: BT.601, BT.709, DCI-P3, BT.2020, full and limited range

Input video formats:

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

Bit depths: 8-, 10-, 12-bit

Pixel formats: planar, semi-planar, packed, bitpacked

Input transfer functions: SDR, PQ (ST 2084), HLG (BT.2100)

Render format: RGB 10-bit (GPU), 4:2:2 10-bit (SDI)

Tone and gamut mapping

360° video rendering:

Input projections: equirectangular, cubemap

Output projections: rectilinear for flat screens, cylindrical for curved screens

Multi-device interaction

Seamless resolution and format switching: GPU, SDI

Multi-device rendering: tiled, clone, alternate, with genlock synchronization

SPINAUDRENDER: AUDIO RENDERING LIBRARY

Low-latency audio rendering

Output devices: WASAPI, 3G-SDI (AJA), 12G-SDI (AJA, Blackmagic), ASIO

Sample formats: 16-bit, 32-bit, float

Multi-device rendering: SDI virtual output up to 32 channels

Internal and external clock support

Audio filters: volume control, resampling

SPINFILTER: HIGH-PRECISION VIDEO PROCESSING FILTERS

Highly optimized for CPUs:

- Software implementation (C++)
- Fast algorithms
- SIMD processing: SSE4.1, AVX2, AVX-512
- Tiled parallel execution
- Automatic filter fusion for optimal locality

Video conversion filters:

- Format conversion: chroma formats, bit depths, pixel layouts
- Resolution scaling: nearest, bilinear, bicubic, lanczos
- Color conversion: RGB/YUV, color space, SDR/HDR, custom LUT conversions
- Cropping, padding
- Overlay: blends an overlay into each image
- Orientation: flip, rotate, mirror
- Geometry conversion: equirectangular, cubemap, cylinder, viewport extraction
- Texture compression: compresses or decompresses BC4 textures

Filter chain:

- Filters can be used individually or combined for complex conversions
- Automatic filter chain generation based on desired target format

Frame-level API



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SPINRAWIO: HIGH-THROUGHPUT I/O LIBRARY

Live SDI capture:

3G-SDI (AJA), 6G-SDI (AJA), 12G-SDI (AJA)

Multi-channel tiled capture for single large surface (SLS):

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

Desktop capture:

APIs: Windows.Graphics.Capture (video), WASAPI (audio)

OS: Windows 10/11

Raw file reading:

Uncompressed YUV with JSON metadata

High-throughput implementation: real-time 8K and beyond

Exports capture clock

SPINSTREAM: LIVE MUXING, DEMUXING, AND STREAMING

Send and receive

Exports stream clock

TS-over-IP streaming: UDP, RTP with optional FEC, SRT, RIST, Zixi

HTTP streaming: HLS, DASH

Dektec and Socket API

SPINLIBAV: FILE MUXING, DEMUXING, AND AUDIO CODING

Container format:

MP4 (ISOBMFF): HEVC, VVC

MPEG2-TS: HEVC, VVC

MKV: HEVC

Audio encoding and decoding: AAC, Opus

SDK COMPONENTS



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C/C++ libraries:

SpinEnc:	VVC and HEVC encoders
SpinDec:	VVC and HEVC decoders
SpinRender:	Video render engine
SpinAudRen:	Audio render engine
SpinFilter:	Video processing filters
SpinRawIO:	SDI and uncompressed YUV capture
SpinStream	Live muxing, demuxing, and streaming
SpinLibAV:	File muxing, demuxing, and audio coding

Command line toolbox:

<i>streamenc:</i>	Real-time encoder
<i>streamplay:</i>	Stream player
<i>spindec:</i>	VVC and HEVC decoders
<i>spinfilter:</i>	High-precision video processing filters
<i>spinrender:</i>	Raw file renderer (DirectX-12, SDI)

API reference documentation (HTML, PDF)

Application code examples

PLATFORM SUPPORT

Modules	Windows 8.1	Windows 10/11	Red Hat 8/9	Ubuntu 20.04/22.04
VVC and HEVC encoders	✓	✓	✓	✓
VVC and HEVC decoders	✓	✓	✓	✓
Video render engine - DX12	x	✓	x	x
Video render engine - SDI	✓	✓	✓	✓
Audio render engine - WASAPI	✓	✓	x	x
Audio render engine - SDI	✓	✓	✓	✓
Audio render engine - ASIO	✓	✓	x	x
Video processing filters	✓	✓	✓	✓
SDI capture	✓	✓	✓	✓
Desktop capture	x	✓	x	x
Streaming	✓	✓	✓	✓
Muxing, demuxing	✓	✓	✓	✓
Audio coding	✓	✓	✓	✓

MINIMUM REQUIREMENTS

CPU:	X86_64 WITH SSE 4.1
GPU rendering:	NVIDIA Quadro Maxwell, AMD Radeon Pro
SDI capture:	AJA Kona 5, AJA Corvid 44, AJA Corvid 88
SDI rendering:	AJA Kona 5, AJA Corvid 44, AJA Corvid 88, Blackmagic Decklink 8K Pro
ASI/IP:	Dektec DTA 2160, Dektec DTA 2162, standard ethernet ports

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