RELEASE NOTES & TECHNICAL DETAILS

HLConvolver 2.14.0 for macOS

Native DSD Input, WavPack, Speaker-Position Routing & High-Performance FIR Convolution

HLConvolver 2.14.0 for macOS is part of the Hang Loose DSP Software Suite.

HLConvolver is a high-performance FIR convolution application and plug-in suite designed for stereo and multichannel audio systems. The macOS version is available as a Standalone application, AUv2 and VST3, with Universal 2 support for both Apple Silicon and Intel Macs. The Suite also includes HLConvolver AAX 1.2.6 and HLHost 2.1.6 as separate components.

One convolver - local or networked audio

One of the things that makes the Standalone version unique is that it can operate in several different audio-system topologies:

CoreAudio -> CoreAudio	CoreAudio -> UPnP
UPnP -> UPnP	UPnP -> CoreAudio

So, for example, HLC can sit between a Mac music application and a local DAC, between a Mac application and a network renderer, or directly between a UPnP player/server and either a UPnP renderer or local CoreAudio device.

Native DSD input for Standalone UPnP playback

HLConvolver 2.14.0 adds native DSD input to the Standalone UPnP playback path.

Supported input formats and rates are:

- Sony DSF: DSD64, DSD128, DSD256 and DSD512
- uncompressed DSDIFF/DFF: DSD64, DSD128, DSD256 and DSD512
- DoP-over-WAV: DSD64, DSD128, DSD256 and DSD512

Native DSD input is unpacked or decoded and normalized to 352.8 kHz planar floating-point PCM before HLConvolver's existing speaker-position routing and FIR-convolution stages. PCM remains the default output path; selecting a DSD input source does not automatically change the configured output mode to DSD.

DoP-over-WAV is positively identified from its marker sequence before a WAV stream is treated as DoP. Ordinary WAV files that do not positively identify as DoP continue through the normal PCM WAV path.

Speaker layout remains metadata-driven and fail-closed. DSF uses the supported Sony channel-type mapping; DSDIFF/DFF uses supported predefined channel identifiers; WAVE_FORMAT_EXTENSIBLE DoP uses its channel mask;

and unmasked stereo DoP uses canonical left/right WAV order. HLConvolver does not guess ambiguous multichannel speaker layouts.

> DST-compressed DSDIFF/DFF is not decoded in 2.14.0 and is cleanly rejected. DSD1024 is outside this release scope. The new feature is DSD input processing; existing DSD/DoP output on supported UPnP-output routes remains a separate capability.

WavPack input for Standalone UPnP playback

HLConvolver supports WavPack (`.wv`) input in the Standalone UPnP playback path. Lossless integer PCM and supported 32-bit floating-point WavPack are accepted; lossy/hybrid WavPack and WavPack DSD are rejected.

The implementation has been validated with stereo material and with 12-channel, 352.8 kHz / 24-bit DXD WavPack. Multichannel routing follows the same speaker-position rules as the other UPnP input formats: HLC uses trusted layout information when available, or the explicit source-layout selection when required; it does not guess ambiguous channel semantics or upmix channels.

Speaker-position routing for multichannel UPnP sources

HLConvolver can route multichannel UPnP source audio by speaker position into a fixed configured system layout. This is routing/normalization, not upmixing: HLC does not invent, duplicate or sum channels simply because the system has more speakers than the source, and unused destination speakers remain silent.

For a 7.1.4 system, the setup is:

```
System speaker layout: 7.1.4 speaker-position routing
Source speaker layout: Assume music layout from channel count
```

The explicit music-layout option supports the predefined 2.0, 4.0, 5.1, 7.1, 5.1.4 and 7.1.4 music layouts. Auto mode uses trusted source speaker-layout information when available rather than silently guessing semantics from channel count.

For the fixed 7.1.4 system bus, the speaker order is:

```
1 L 2 R 3 C 4 LFE 5 Ls 6 Rs
7 Lrs 8 Rrs 9 Ltf 10 Rtf 11 Ltr 12 Rtr
```

Two examples from real playback testing:

```
5.1 music source:
L, R, C, LFE, Lrs, Rrs
-> outputs 1, 2, 3, 4, 7, 8
7.1.4 source:
L, R, C, LFE, Ls, Rs, Lrs, Rrs, Ltf, Rtf, Ltr, Rtr
-> identity map, outputs 1-12
```

Both 5.1 and 7.1.4 playback were tested successfully through the UPnP -> CoreAudio route with a 12-channel HLC filter configuration.

The Web UI reports the routing state live while playback is running, including the source layout, the source-layout basis, the active system layout and the effective source-to-speaker map.

Automatic CoreAudio sample-rate following

The CoreAudio engine can follow valid source sample-rate changes automatically, provided the selected input/output devices support the requested rates.

In normal use this means a mixed-rate music library can move, for example, from 44.1 kHz to 96 kHz, 192 kHz or DXD without manually changing the sample rate inside HLC.

Non-uniform convolution

HLC provides four convolution-processing choices:

```
Zero - uniform-partitioned, zero-latency convolution
4096 - non-uniform convolution
8192 - non-uniform convolution
16384 - non-uniform convolution
```

The larger non-uniform modes are particularly useful for very long FIR filters, high sample rates and large multichannel systems, where reducing the continuous DSP workload can make the difference between an impractical and a usable real-time configuration.

We performed some fairly extreme engineering testing during 2.12 development on an Apple M1 Mac mini.

At 705.6 kHz, a stereo 65,536-tap/48-kHz FIR expanded through FIR resampling to approximately 963,000 taps per channel. Zero-latency convolution averaged 65.0% of the available real-time DSP window. Non-uniform 16384 reduced that to 29.9%, a reduction in average DSP processing time of about 54%. Both 8192 and 16384 played cleanly in this test.

We also tested a much larger real-world multichannel configuration at 352.8 kHz: 12 input/output channels, 23 active convolution paths and more than 11 million active FIR coefficients after resampling.

With that workload:

Convolution mode	Average real-time load	Result
Zero latency	132%	Unable to sustain clean playback
Non-uniform 8192	93.6%	Clean playback
Non-uniform 16384	77.5%	Clean playback

In other words, changing the convolution partitioning alone moved that workload from not real-time-capable to clean playback on the same M1 Mac mini.

These are measured examples from one test system, not claimed product limits. Actual performance depends on CPU, OS scheduling, sample rate, FIR length/topology, number of channels, audio devices, host/route and buffer size.

Other features

HLConvolver 2.14.0 also includes:

- Universal 2 Standalone, AUv2 and VST3 for Apple Silicon and Intel
- HLConvolver AAX 1.2.6 and HLHost 2.1.6 as separate Suite components
- four Standalone route families: CoreAudio -> CoreAudio, CoreAudio -> UPnP, UPnP -> UPnP and UPnP -> CoreAudio
- speaker-position routing for multichannel UPnP sources into a configured 7.1.4 system bus, with unused speakers silent and no upmixing
- live Web UI speaker-routing status including source layout, source-layout basis, active system layout and effective map
- rate-specific FIR configuration support
- bundled r8brain FIR resampling when a rate-matched FIR is not available
- per-filterbank transition band, stopband attenuation and filter phase controls in both the Native and Web UI
- FIR latency reporting in samples and milliseconds, with plug-in latency reported to the host
- browser-based Web UI
- headless operation and macOS Background Service
- hardened plug-in state restoration
- offline workflows such as Apply, Batch and Bounce, subject to host capabilities
- UPnP input support for WAV, AIFF/AIFC, FLAC, WavPack (`.wv`), Sony DSF, uncompressed DSDIFF/DFF and DoP-over-WAV
- selectable UPnP PCM output at 16-, 24- or 32-bit
- DSD/DoP output on supported UPnP-output routes

Purchase, free trial and downloads

A free 14-day trial, perpetual-license purchase and current platform downloads are available here:

accuratesound.ca/hang-loose-dsp-software-suite/

The license includes six activations, future upgrades are included, and HL-DSP-Suite is not a subscription product.