



# Sigma Media Live

## Broadcast and Streaming

### Premium video compression

**Sigma Media Live** is the latest solution from Sigma Streaming Platform for streaming and broadcast compression headends. It is based around Sigma's software encoder for both live linear broadcast and streaming applications. It also includes Sigma's packager, origin server, and transport stream multiplexer / scrambler.

- Wide player and device support for all major segment and manifest formats (HLS, SS, DASH, CMAF)
- The minimum bit-rate required whilst maintaining picture quality whether using MPEG-2, MPEG-4 AVC or HEVC
- SD, HD, 1080P or UHD services, including support for High Dynamic Range
- Wide audio codec support
- Rich subtitles management including ingest of DVB subtitles, teletext and closed caption and their translations for each format
- DRM and broadcast content protection support via CPIX and DVB-CSA standards, including a route to DVB-CSA V3.
- AI Compression Technology (ACT) delivers the best possible quality with available compute with real time content analysis codec optimisation.

### Single solution for all infrastructures

As operating a video headend is not the same for all, Sigma Media Live Headend can be deployed in different ways:

- Deployed either on:
  - Sigma reference hardware
  - Dedicated data center hardware
  - Private Cloud infrastructure
  - Public Cloud deployment

Through integral industry and technology partner integrations, Sigma Media Live Headend provides a complete content delivery solution.



**Sigma Media Live** from Sigma Streaming Platform is a broadcasting and streaming headend solution which enables broadcasters, streamers and IPTV to minimize costs whilst maintaining picture quality. It can also help improve operational efficiency, and provides a straightforward evolutionary path to all IP workflows, and deployment in private and public cloud.

## Video compression performance

Video quality or compression performance is at the heart of Sigma Media Live. It allows headend operators to reduce the bit-rate required for each of their services whilst maintaining the picture quality. This can provide significant savings in transmission costs, or allow new services such as UHD channels to be launched within existing transmission network capacity.

Sigma's video algorithm team continually strive to improve the compression performance, not only on the latest codecs such as HEVC but also on MPEG-4 AVC and MPEG-2. After all the majority of TV channels are still using MPEG-2.

## Operational Excellence

Operational excellence is important and it helps provide the 99.999% reliability or better, that consumers expect. With the ever increasing pace of change, areas such as ease of operation, maintenance, upgrade, and the flexibility to easily expand a system in scale or functionality are increasingly important.

The software components within Sigma Media Live are all designed to be 'cloud native', which means that they are based around a micro-services architecture.

This allows the same components within a system' (or similar) to be deployed as software only, on bare metal, or in a private or public cloud instance. For those who want a traditional, appliance style system, these same components can be deployed on individual servers

Ultimately this means everyone can access the benefits offered by Sigma Media Live today in the deployment model that suits their needs today, but with a clear evolutionary route to all IP workflows, and even cloud deployment in the future.

## Advance feature: AI-driven Video Compression for Live

Sigma leverages AI throughout our video compression solutions to achieve significant bitrate savings while maintaining or improving video quality and encoding faster. We accomplish this by:

- **Scene Classification:** Our AI employs state-of-the-art scene categorization to identify video content types (e.g., sports, animation, screencast, UGC, PGC, eLearning, etc.). This allows for targeted encoding strategies to optimize bitrate, quality, and encoding speed and efficiency.
- **AI-driven Video Enhancement:** We utilize AI for techniques like image quality repair, super resolution, and intelligent tone mapping. These techniques enhance visual fidelity, allowing for lower bitrates without sacrificing quality.
- **Content-Adaptive Encoding:** Sigma's AI implements Region-of-Interest (ROI) based rate control and frame-level adaptation. This allocates more bits to critical regions of the frame and the video, further optimizing bitrate efficiency. Underpinning these functionalities are Convolutional Neural Networks (CNNs), machine learning algorithms, and image processing techniques. An in-house AI-powered quality assessment mechanism ensures consistent video quality throughout the encoding process.
- **Compression algorithm optimization targeting different rate control algorithms such as CRF, ABR, and CBR:** For different rate control algorithms, this optimization deeply refines various aspects of the encoder, including reference frame selection, frame type selection, adaptive quantization in the temporal/spatial/frequency domains, to achieve ultimate compression ratios and meet the requirements of diverse application scenarios.



## Input

|                         |                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Compressed Input</b> | <b>Type:</b> UDP MPEG-2 TS (MPTS & SPTS) via unicast or multicast (IGMP v2 and v3 ), RTMP (H.264 HD, ACC)<br><b>Protocols:</b> MPEG-2 TS (MPTS & SPTS), RTMP<br><b>Codec:</b> MPEG-2, H.264, HEVC – MPEG-1 LII, Dolby Digital (AC-3), Dolby Digital Plus (E-AC3), AAC, HEAAC v1 and v2, Dolby E (baseband input only)<br><b>Data rate:</b> SD / HD up to 50 Mbps, UHD up to 80 Mbps |
| <b>Redundancy</b>       | Auto switch to backup input when primary input fail                                                                                                                                                                                                                                                                                                                                 |

## Pre-Processing

|                            |                                                                                                                                                                                                                                                                                             |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Aspect ratio</b>        | WSS, AFD, Video index                                                                                                                                                                                                                                                                       |
| <b>Metadata</b>            | SCTE-104, SCTE-35, IA 608 / 708 Closed Caption, SCTE-20, DVB Teletext, DVB-VBI, SCTE-27, OP47, SMPTE 2031, VITC , SMPTE 2038, ARIB B24                                                                                                                                                      |
| <b>Image settings</b>      | Brightness, Contrast, Saturation, Hue, Gamma, Temperature                                                                                                                                                                                                                                   |
| <b>Enhancement filters</b> | <b>Video:</b> De-interlacing, Cropping, Letter boxing, Stretching, SD and HD Cross-scaling, 3:2 Pull down, MCTF, Deblocking filter, Spatial Denoising filter, Cross Talk filter, Sharpening, Diamond filter<br><b>Audio:</b> Automatic loudness control (A/85), Audio gain adjustment, Mute |
| <b>Image overlays</b>      | Image insertion on input loss (blackout)<br>logo insertion                                                                                                                                                                                                                                  |
| <b>Filter</b>              | Video and Audio Enhancement Filters                                                                                                                                                                                                                                                         |
| <b>AI Add Marker</b>       | Using AI technology to recognition event/scene which need to add advertising material for OTT system.                                                                                                                                                                                       |



## Video Encoding

|                       |                                                                                                                                          |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Video codec           | HEVC Main 10, HEVC Main Profile, H.264 Baseline / Main / High profile, MPEG-2 HDR: HDR10, HLG10, PQ10. Dolby Vision 8.1 & 5.0            |
| Rate control          | CBR, VBR, Statistical Multiplexing, Constant Video Quality , ACT                                                                         |
| Data rate             | From 100 kbps to 60 Mbps <sup>(1)</sup>                                                                                                  |
| Resolutions           | <b>Progressive:</b> from QCIF to UHD, up to 60 fps<br><b>Interlaced:</b> 480i, 576i, 720i and 1080i                                      |
| Multi-stream          | Shared and Split encoding for ABR outputs                                                                                                |
| Templates             | Channel templates creation and management<br>Default profiles templates for SD, HD & UHD services                                        |
| Hardware Acceleration | <b>NVENC and Normal CPU encoding</b> up to UHD, H.264, HEVC, MPEG-2 CBR<br><b>Compression CPU encoding</b> up to FullHD with H.264, HEVC |

(1) Depends on codec and resolution

## Audio Encoding

|                            |                                                                                                                               |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Audio channels per service | Up to 8 stereo pairs. Radio Channels                                                                                          |
| Audio encoding             | MPEG-4 / MPEG-2 AAC, HE-AAC v1 and v2, AMR-NB, AMR-WB, Windows Media Audio / Audio Pro, Transcode to Dolby Digital Plus (DD+) |
| Pass-through               | MPEG 1 LII, AC-3, Dolby Digital Plus (E-AC3) 5.1-ch or stereo, Dolby E                                                        |
| Data rate                  | From 4.75 kbps to 320 kbps                                                                                                    |

## Metadat

|                                        |                                                                                     |
|----------------------------------------|-------------------------------------------------------------------------------------|
| Subtitles pass-through and translation | EIA 608/708 Closed Caption, SCTE-20, DVB Teletext, DVB Subtitles, SCTE-27, ARIB B24 |
| Ad insertion                           | EBIF / EISS / AITSCTE-35 pass-through                                               |
| Nielsen                                | Watermark extraction for multi-screen devices                                       |



## Multiplexi

|                    |                                                                                                                                                                                                                                                                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inputs and outputs | IP (UDP or RTP) input and output of MPEG Transport Streams<br>ASI input and output (max 8 per server, optional hardware required) RTP re-ordering<br>IGMP V3 redundancy<br>Input bit-rate monitoring and CC error detection SMPTE 2022-1 FEC on input and output                                                                           |
| Processing         | Full re-multiplexing support including real-time PSI regeneration, and dynamic rules- based pass-through of descriptors<br>PID re-mapping<br>SI/PSI generation/re-generation and insertion from external source<br>Statistical multiplexing bit-rate allocation for Sigma software encoder<br>Bitrate policing<br>Input Content Extraction |

## Streaming Output Processing

|                    |                                                                                                                                                                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Formatting         | Apple HTTP Live Streaming (Over CMAF or TS), Microsoft Smooth Streaming, DASH Common CMAF segment delivery for HLS and DASH<br>Low Latency Chunking support for DASH and Apple Low Latency                                                                         |
| Subtitling         | <b>Closed Captions:</b> WebVTT for HLS, WebVTT or SMPTE-TT for DASH<br><b>DVB-Teletext page 888:</b> WebVTT for HLS, WebVTT or SMPTE-TT for DASH<br><b>DVB-Subtitles:</b> SMPTE-TT for DASH                                                                        |
| Multi audio        | Multiple audio streams per output for HLS, Smooth Streaming and DASH                                                                                                                                                                                               |
| Content protection | Microsoft PlayReady DRM support for HLS / TS, Smooth Streaming and DASH<br>Apple Segment for HLS / TS<br>FairPlay support for HLS / TS and HLS /<br>CMAF Widevine, PlayReady support in<br>CTR mode DASH Widevine and<br>PlayReady support in CBC mode for<br>DASH |



## Packaged Output

|                    |                                                                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Content publishing | Support for pull scenarios in just-in-time packaging<br>Support publishing to local storage or to S3 third party servers                                                                                                                |
| Origin server      | Built-in live and VOD origin server for HLS and DASH Up to 8000 simultaneous connections<br>Custom HTTP headers management (Expiry settings, CORS headers...)<br>Built-in support of HTTP 1.1 Chunked Transfer Encoding for Low Latency |
| CDN                | Interfaces to leading CDNs                                                                                                                                                                                                              |

## Monitoring & Control

|                              |                                                                                                                                               |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Control interface            | Access through API & GUI is provided by Sigma Streaming Platform                                                                              |
| Control and system protocols | REST, HTTP, NTP, FTP, IGMP v2 / v3, SNMP v2 / 3c                                                                                              |
| High availability            | Support both 1+1 and N+M redundancy schemes Service synchronization on encoder and packager                                                   |
| Content replacement          | SCTE-35 in-band / ESAM out-of-band<br><b>Triggers:</b> Time signal, Splice-out / Splice-in, Alternate command, or manually triggered from API |