



Choosing Your Next Enterprise Encoder

Why many organizations are choosing Capella Systems Cambria FTC Encoder



Introduction

“Cambria FTC allowed us to handle more uniformly all the deliveries, helping us save time and resources. Also, Cambria Cluster Manager was much easier to integrate with our content management system than previous solutions.”

*Jose Conde, Team Leader IT
Multimedia Products Enabler
and Video
Hutshison Drei Austria GmbH*

At some point in the very near future, many organizations will have to replace legacy software encoders like Harmonic’s Carbon Coder or Telestream Episode, or other encoders like Telestream Vantage. Perhaps it will be to access additional formats, or faster performance, or expanded deployment options. Or it might be to access advanced features like per-title encoding, enhanced subtitle support with OCR for burned in captions, or support for the Interoperable Master Format (IMF) that vastly simplifies delivering worldwide content from a single package. Whatever the reason, at some point, waiting to upgrade will start costing more money than it saves.

Over the last few years, many professionals moving on from legacy encoders have chosen Capella Systems Cambria FTC encoder. Designed and created by several ex-Rhozet employees, Cambria addresses limitations in Carbon Coder while preserving many of its strengths. After a brief introduction to Cambria, this document will discuss the four major reasons why companies upgrading from Carbon Coder choose Cambria, which are access to new input and output formats, higher quality, faster performance and new features.

Meet Cambria FTC

Cambria FTC is a scalable, enterprise-level file transcoder that runs on 64-bit Windows (10, Server 2012/2016), either as a single machine or as part of cluster of machines. Capella offers flexible licensing options that allows Cambria to run on any designated local workstation, or in a public or private cloud.

You can operate Cambria via user interface, watch folders, or extensive REST API. At the heart of Cambria is a clean,

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future-proof transcoding engine that supports 4K/8K/HDR and 8/10/12-bit compressed and uncompressed workflows. Cambria features “growing” file support for files transferred from remote sources like FTP and S3, so encoding can start before the file is fully downloaded to the encoding station, accelerating encoding times. Cambria can produce an extensive range of broadcast and streaming formats, and advanced technologies like Nexguard video watermarking.

Cambria supports popular plug-ins like the EZTitle Subtitles Plug-in, and comes with a range of useful filters, such as a black frame remover, color bar remover, color range adjustment, 601/709 correction, denoiser, logo overlay, text burn-in, Teletext burn-in, DVB subtitle burn-in, XML titler, DVD subtitle burn-in, subtitle burn-in, closed caption burn-in, SST, time code burn-in, and time code overwrite.

Around the world, Cambria is used by a number of prominent companies, including the Fox Networks Group, Televisa, CBC, CCTV, Nikkei CNBC, DREI, and Amore Pacific.

New Input/Output Formats

The streaming and broadcast markets are transitioning towards larger resolutions and high dynamic range video, initially for smart TVs, but also for deployment to newer Apple endpoints. This requires support for new codecs, HEVCs, and multiple HDR formats.

Cambria offers the x265 HEVC codec as an option. Another upgrade enables Cambria to convert JPEG2000 and Dolby Atmos audio input (with Dolby Vision interleaved metadata) to Dolby Vision with Atmos audio output in Profile 5. These options allow Cambria customers to effectively serve newer and more lucrative markets, and ensures that Cambria customers can meet their broadcast and streaming requirements for years to come.

Advanced support of ProRes, x264, and x265 were the primary codec drivers for our switch from Carbon Coder to Cambria FTC.

*Eric Smith, VP, Technical Operations,
DataTech Broadcasting*

Exceptional Video Quality

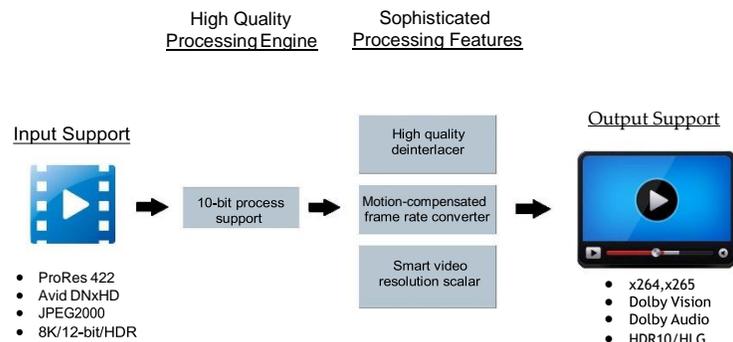
Exceptional video quality is the result of multiple factors, including high quality input support and output codecs, which we've already covered. Cambria can also pass through many codecs for many different operations, avoiding retranscodes that can reduce quality.

Cambria performs most operations at 10-bit color depth or more to avoid aliasing and other artifacts that can occur at lower bit depths. Cambria FTC performs high-quality, multi-frame, motion-adaptive deinterlacing. It can adjust playback speed with audio pitch correction when necessary, as in 24p to 50i conversion. Its content-adaptive frame conversion minimizes stuttering, and an automatic scaling algorithm helps produce optimal visual quality.

“The new Motion Compensation Frame Rate conversion is a very effective and powerful addition to Cambria FTC that allows fantastic and smooth frame rate conversions of really high an impressive quality. This

will help bring the best out of our frame rate conversion jobs.”

Bastien Laurent, Head of Post Production and Digital Fabrication, Marc Dorcel



Cambria is architected for outstanding quality.

Cambria inputs most videos natively, processes at high color depth using state-of-the-art tools, and outputs best-of-breed codecs. The result is exceptional video quality.

Outstanding Performance

Encoding speed translates directly to throughput, and optimal performance can often make the difference between needing one system for your encodings, or

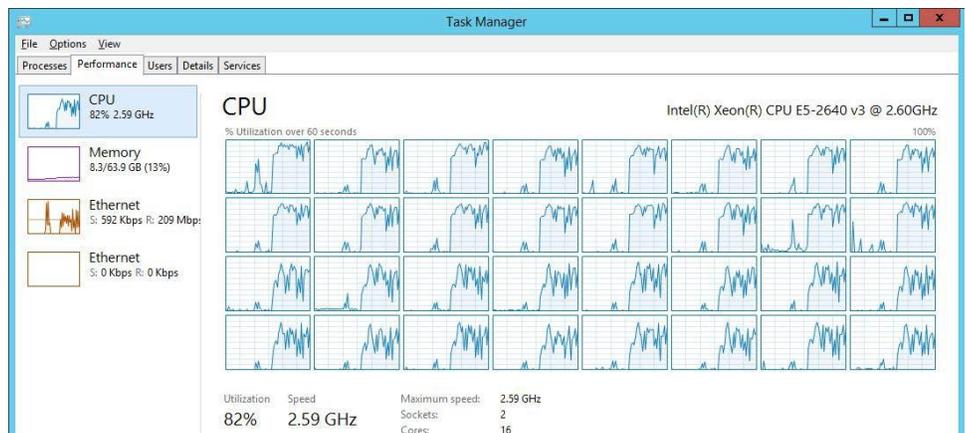
needing multiple systems. In this regard, Cambria is highly optimized for maximum encoding speed.

As an example, Cambria uses a single scaling and deinterlacing process for all streams of output at the same resolution, speeding up the creation of adaptive bitrate encoding ladders. All processes like deinterlacing, frame conversion, and scaling are highly optimized, and Cambria uses codecs like x264 and x265 that are best in class for both speed and quality.

Cambria is also highly optimized for maximum performance on multi-core computers. As an example, the figure below shows CPU utilization on a 32-core workstation while encoding a single file to H.264 format. As you can see, Cambria efficiently spreads the work among the available resources, to minimize encoding time.

“Cambria delivers fantastic results for OTT applications (quality, features, and speed) using our preferred H.264 implementation X.264”

Bastien Laurent, Head of Post Production and Digital Fabrication, Marc Dorcel



Cambria efficiently utilizes available resources, even when encoding a single file.

If you’re interested in specific numbers, Capella Systems offers multiple encoding benchmarks for Cambria on the company’s website. On a 2x Intel Xeon CPU E5-2640 v3 running at 2.60GHz, encoding 1080p input to four outputs for adaptive streaming at 2X real time (see table on following page).

Cambria offers multiple options that let users customize CPU utilization for their own needs. For example, for

“We switched from Carbon Coder to Cambria FTC because Carbon Coder was at the end of the product cycle and lacked many critical features like HEVC and HDR. Cambria FTC also supports the acTVila standard that is widely used in Japan and comes with acTVilla presets. We like the ability to execute transcoding jobs via command line and find the Cambria FTC API much more modern and easier to use than Carbon Coder.”

*NTT TechnoCross
Cambria Licensee and
Reseller*

maximum throughput, you can choose to encode multiple-transcode jobs simultaneously, which will saturate nearly all CPU resources. To preserve CPU resources for other uses, you can encode one job at a time, and even encode each stream in an adaptive group as a separate job.

Users deploying Cambria in the cloud may choose one configuration for lower-cost and lower-power computers, and a different configuration for more powerful computers. These options let you customize operation to match your computing power and unique computing requirements.

STREAMING		
	Source is MPEG-2 TS 1080p30	
Target Codec	Avg. CPU Utilization	Encoding speed
HLS Streaming H.264 (1080/720/480/240)	95%	2.03x RT
MPEG-DASH, H.264 (1080/720/480/240)	95%	2.02x RT
Microsoft Smooth Streaming (1080/720/480/240)	95%	2.03x RT

Cambria encodes four output streams in 2x real time.

Advanced Features

Beyond format support, optimum quality, and fast throughput, Cambria offers a range of features that Carbon Coder and other legacy encoders simply cannot match.

Scriptable Workflows and Source Adaptive Bitrate Ladders

For example, Cambria supports scriptable workflows that can automatically set transcoding options (for encoding, filters, etc.) based on the properties of the source video file. Using scripts, you can automatically set output resolutions and frame rates based upon the source, or elect to pass through encoded audio in the proper format but encode audio in uncompressed and other formats.

Users can deploy scripts in watch folders to automate many complex operations. For example, you can configure watch folders to look for a group of files, like an MP4, XML, and PNG file with the same base filename. Using the workflow script, you can transcode the MP4 file adding the PNG file as an overlay, and use the XML file to define in/out time codes, and transform other attributes into output metadata XML. You could also specify groups and scripts to combine video with additional languages in separate WAV files and closed caption files.

One of the more useful and unique script-driven operations is the Source Adaptive Bitrate Ladder (SABL). In brief, SABL adjusts the data rate of the clip according to its encoding complexity. By using SABL, Cambria encodes easy-to-compress clips, like talking heads, at a lower data rate than high-motion videos, like action movies. Since the data rate is customized for all clips, quality is maintained irrespective of content.

Operationally, Cambria starts by running a test encode of the entire clip to gauge encoding complexity. Based upon these results, then encoder can shift the data rate of the entire encoding ladder up or down, to improve quality or minimize bandwidth and storage costs. By customizing the encoding script, users can improve the viewer quality of experience by increasing resolution for easy to encode clips like animations or screencams, and save encoding time by eliminating rungs below a certain data rate. All these operations are completely customizable by the user.

“We really enjoyed developing our EZTitles Plug-in for Cambria FTC as their cleverly designed API made that a breeze. It is effortless to use but not at the expense of functionality”

Dimcho Daskaloff

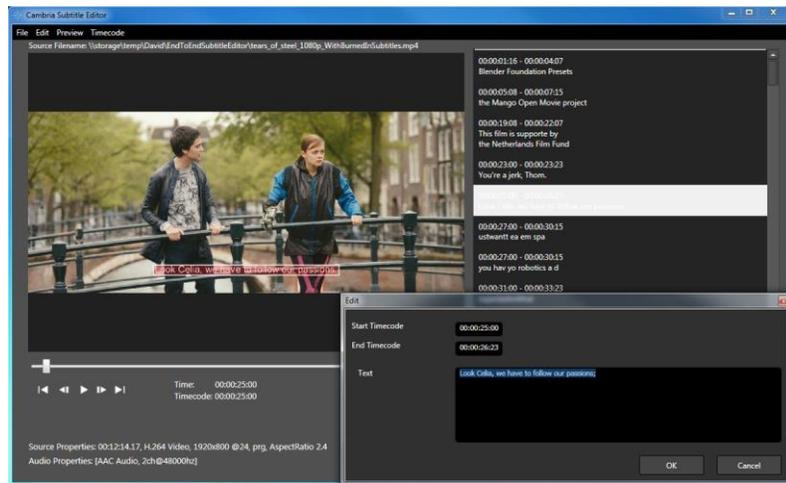
EZTitles Team

Cambria Subtitle Editor

Subtitles are increasingly important for streaming, whether by law or to better serve hearing impaired viewers. Cambria includes a number of features to simplify subtitle creation and deployment. For example, Cambria can use OCR to read information from slates, credits, or captions burned into the source videos. Cambria preserves both the time code and the text for fast indexing, or to deploy captions in other languages.

"We switched to Cambria due to the lack of continued development on the stand-alone Carbon Coder application, which was resulting in an inability to process necessary file formats."

*Eric Smith, VP, Technical Operations,
DataTech Broadcasting*



The Cambria Subtitle Editor lets users correct OCR errors and position text spatially and temporarily.

New in version 4.0 is the Cambria Subtitle Editor (above), which displays the video on the left while simultaneously displaying the text and time code on the right, allowing users to correct the text and adjust positioning. The text and time code can be output as an XML or STL file for further editing or deployment.

S3 Read/Write Support

Amazon S3 is an increasingly useful storage location for many broadcast and streaming producers. With version 4.0, Cambria now has the ability to read and encode some file formats directly from S3 storage, though in the first iteration, this is only supported for jobs submitted through the API, not for jobs created in the user interface or triggered via watch folders.

Some, but not all file formats can be transferred to S3 while encoding, speeding their availability, though some other formats must be transferred to S3 via a post-task upload. For both intake and delivery, this automation saves what can often be a time-consuming manual file transfer to and from your S3 buckets.

HEVC Dynamic Encoding

x265 is a high-quality HEVC codec with potentially lengthy encoding times. To produce the best possible quality in the shortest possible encoding time, Dynamic Encoding takes a quick snapshot of the encoding complexity of the entire clip. Then, during encoding, Cambria applies high quality presets to optimize quality in hard-to-encode sequences and faster, lower-quality presets to easy-to-encode regions where the quality difference won't be visible.

Cloud/Local Load Balancing

This new feature allows Cambria users to deploy on-premise resources for normal encoding, with automatic spillover to the cloud for spikes in encoding demand. This minimizes costs while enabling responsiveness to peak encoding requirements.

ProRes Source Error Tolerance

Source Error Tolerance now works for ProRes sources. Users can specify how many source frames to ignore (per minute) and continue decoding when FTC encounters certain errors in the source file. This enables encoding to continue, but may result in duplicated or skipped source frames.

Advanced Audio Features

Cambria offers flexible multi-track audio handling that can fix incorrect mappings, create separate tracks for streaming (stereo, surround), separate multiple languages into separate files, and add/replace tracks in video file. These modifications can be made via the user interface and also scripted and implemented via watch folders or the API to simplify repetitive operations. Cambria also has advanced features like an ITU-R BS. 1770-3 Loudness preset for the Audio Normalizer, which ensures EBU R128 compliance.

In/Out Points by Time Code

Cambria can set in and out points by time code, allowing users to easily create custom versions of their content for different distribution points without having to create a mezzanine file. Since Cambria can use time codes to set in and out points, users have an easy method to reference cut/clip lists that are based on time code.

“Unlike Carbon Coder, Cambria can pre-cut a movie into scenes by adding a bunch of timecode selections, then transcode all the parts directly into different files.

Bastien Laurent, Head of Post Production and Digital Fabrication, Marc Dorcel

Same-as-Source Settings

Many encoding configurations include same-as-source settings to avoid inadvertently changing critical parameters like resolution, frame rate, audio channels and the like. It also enables a single preset to work with different sources like videos with different input resolutions or frame rates.

Source Analysis and Preset Creation

Cambria can inspect the properties of a video file and generate an encoding preset to create identical outputs, including resolution, codecs, bitrate, and other information such as Transport Stream PIDs and repeat rates. This allows Cambria users to easily match presets created and deployed in different transcoding programs, simplifying the transition from your former encoder.

Take The Next Step

It's time to retire Carbon Coder and other legacy encoders and access the formats, features, quality and performance delivered by Cambria FTC. To request a demo or trial version, please send us a mail to sales@x-dream-distribution.com.