RHOZET
Universal Media Transcoding

New Feature Descriptions
Carbon Coder 3.14

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Rhozet, a Business Unit of Harmonic, Inc.
www.rhozet.com
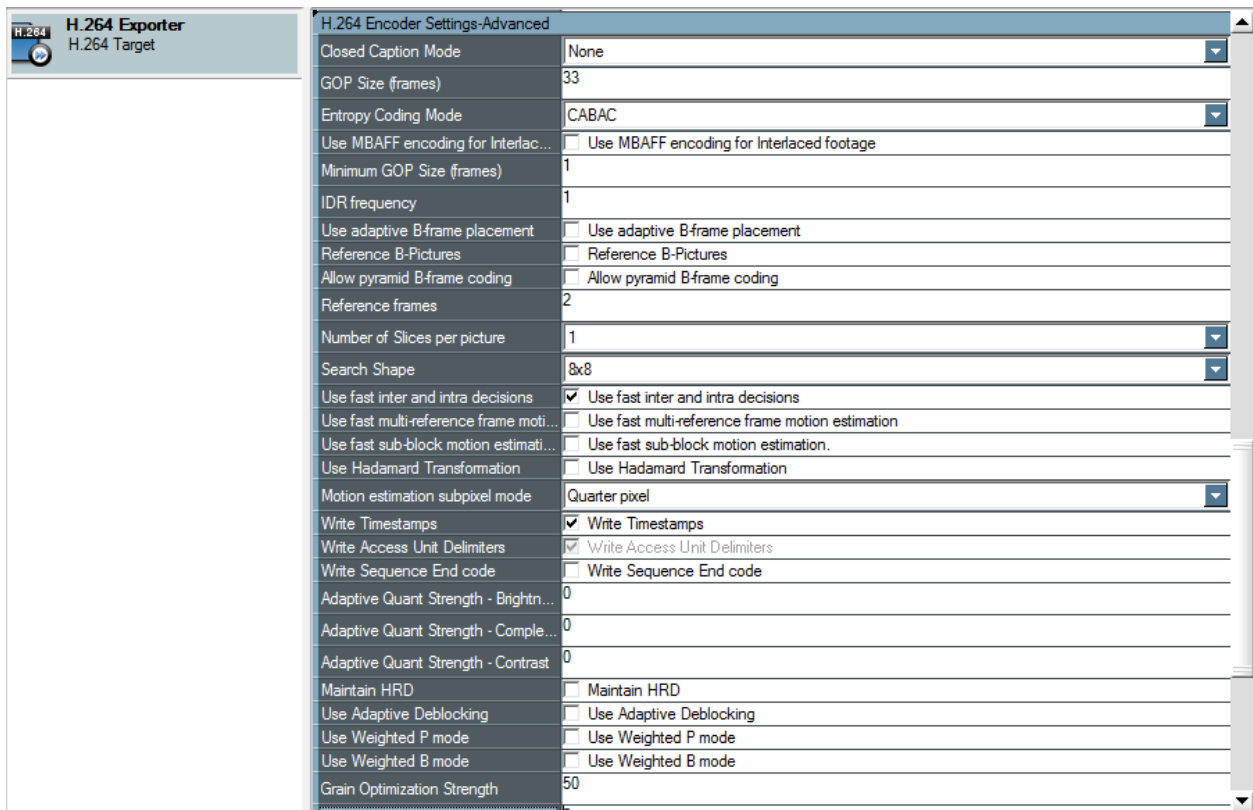
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Introduction

Carbon 3.14 introduces a host of new features to the Carbon transcoding engine and two new tools to monitor Carbon Server farms. The new features, described below, enhance Carbon's format support, improve speed and quality of transcoding, all while improving reliability and scalability.
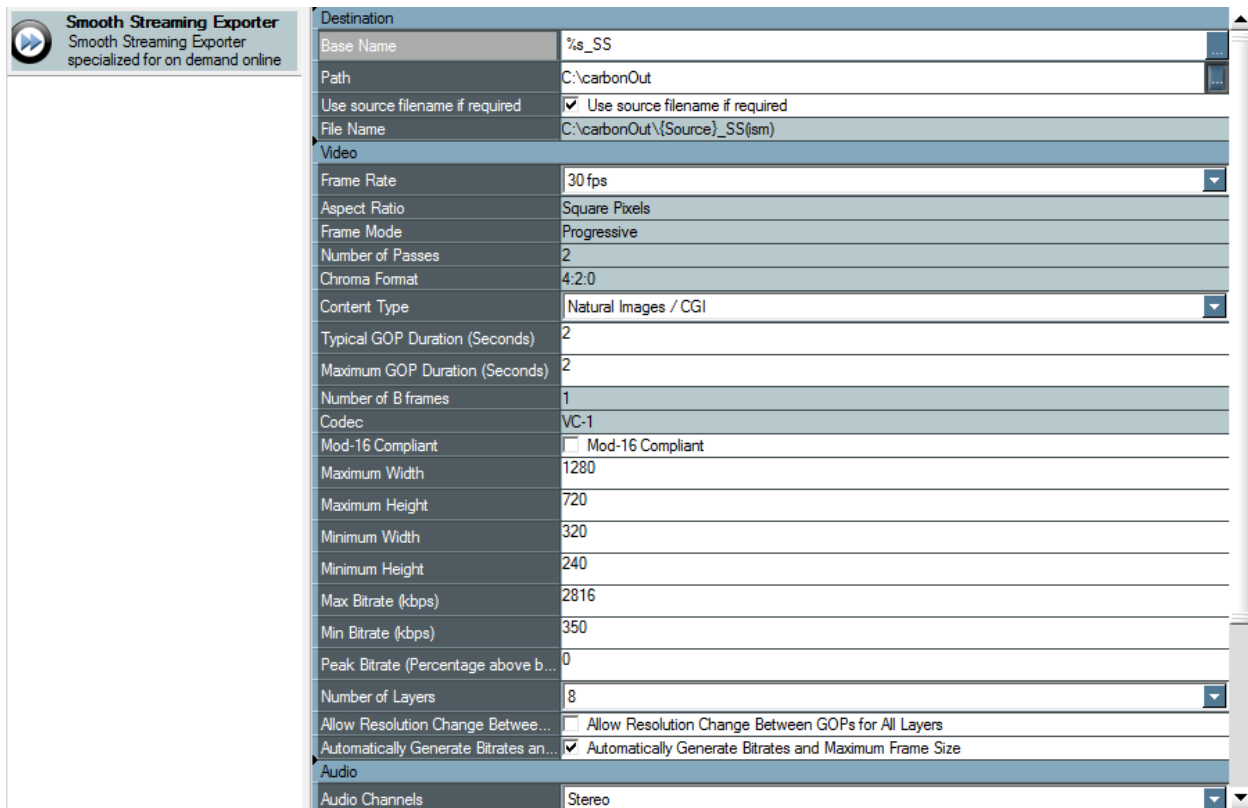
1. Improved H.264 Exporter – the H.264 exporter has been updated to improve quality and increase transcoding speed. Many new settings are now exposed allowing the ability to truly tune the exporter to meet higher video quality while hitting lower bitrates. The exporter also adds compatibility for more devices, such as the iPhone OS v3.0.
2. Microsoft Smooth Streaming Exporter – this new exporter introduces Microsoft's Smooth Streaming SDK allowing you to create multi-bitrate streaming files with the VC-1 video codec and deliver them to Microsoft Silverlight players.
3. Avid MXF Exporter – a new exporter has been added allowing the creation of MXF wrapped Avid codecs for compatibility with many Avid products.
4. Motion-Compensated Temporal Filter (MCTF) – the MCTF filter is an advanced video algorithm from the Harmonic codec research and development team. The MCTF filter allows you to hit lower bitrates without losing video quality.
5. De-Blocking Filter – also from the Harmonic codec research and development team, this advanced de-blocking filter helps to remove blockiness in a compressed source file before the final encode.
6. STL Caption Video Filter – this new video filter burns captions from an STL file into the output video.
7. VITC Video Filters – two new video filters to extract and insert information to and from the Vertical Interval Timecode (VITC).
8. ITU 1770 Audio Filter – this audio filter allows standards based adjustment of audio levels to meet broadcast requirements.
9. Rhozet Programming Interface (RPI) – the RPI allows 3rd parties to develop importers, exporters, and filters for use in the Rhozet transcoding pipeline. The first adopter of this new interface is Google's ContentID service. http://www.youtube.com/t/contentid
10. Carbon Farm Manager (CFM) – the CFM is a service which runs outside of your Carbon Server Farm environment. It monitors for stalled jobs as well as other problems and performs routine maintenance like scheduled, graceful reboots of the entire farm.
11. Carbon Farm Analyzer (CFA) – the CFA reports information about the utilization and status of the machines in your transcoding farm in addition to what's available in the Carbon Admin interface. This tool is extremely helpful in tracking down problematic situations.

Improved H.264 Exporter

H.264 Exporter	H.264 Encoder Settings-Advanced	
H.264 Target		
	Closed Caption Mode	None
	GOP Size (frames)	33
	Entropy Coding Mode	CABAC
	Use MBAFF encoding for Interlac...	☐ Use MBAFF encoding for Interlaced footage
	Minimum GOP Size (frames)	1
	IDR frequency	1
	Use adaptive B-frame placement	☐ Use adaptive B-frame placement
	Reference B-Pictures	☐ Reference B-Pictures
	Allow pyramid B-frame coding	☐ Allow pyramid B-frame coding
	Reference frames	2
	Number of Slices per picture	1
	Search Shape	8x8
	Use fast inter and intra decisions	☑ Use fast inter and intra decisions
	Use fast multi-reference frame moti...	☐ Use fast multi-reference frame motion estimation
	Use fast sub-block motion estimati...	☐ Use fast sub-block motion estimation.
	Use Hadamard Transformation	☐ Use Hadamard Transformation
	Motion estimation subpixel mode	Quarter pixel
	Write Timestamps	☑ Write Timestamps
	Write Access Unit Delimiters	☑ Write Access Unit Delimiters
	Write Sequence End code	☐ Write Sequence End code
	Adaptive Quant Strength - Brightn...	0
	Adaptive Quant Strength - Comple...	0
	Adaptive Quant Strength - Contrast	0
	Maintain HRD	☐ Maintain HRD
	Use Adaptive Deblocking	☐ Use Adaptive Deblocking
	Use Weighted P mode	☐ Use Weighted P mode
	Use Weighted B mode	☐ Use Weighted B mode
	Grain Optimization Strength	50

The H.264 encoder in Carbon 3.14 has been updated. This new version boasts much faster transcoding at lower bitrates and much higher video quality at all resolutions without any modification to your existing presets. 20 new settings have also been exposed allowing you to more finely tweak your presets to your source content. The most prominent new features include a de-blocking filter built into the encoder and the ability to independently set adaptive quantization levels for brightness, complexity, and contrast. The MPEG-4 muxer has also been improved to support the new streaming protocols for Apple's iPhone 3.0 operating system.
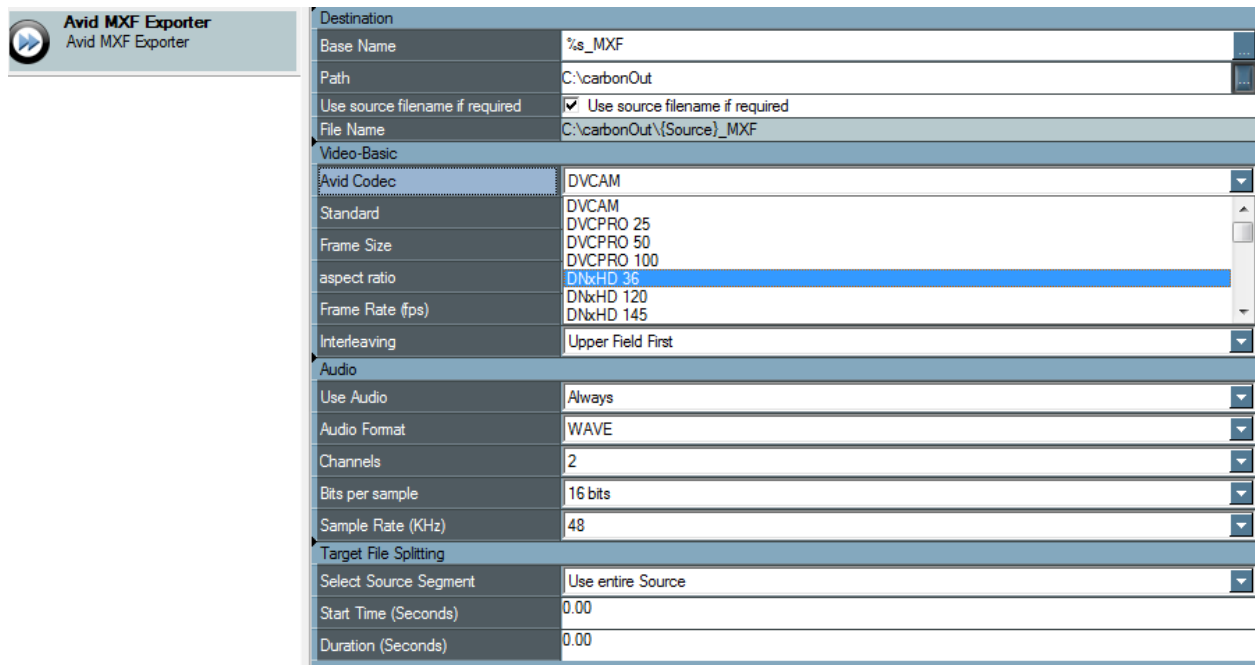
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Microsoft Smooth Streaming Exporter

The introduction of the Microsoft Smooth Streaming exporter allows you to create multi-bitrate streams to playback in Microsoft's Silverlight-based players. This technology uses an intelligent form of progressive download to simulate live streaming. By taking the burden off of the streaming server and moving it to the player this allows content hosts to serve video on demand with a very simple system. The exporter was developed in conjunction with Microsoft to ensure the best possible implementation. The initial release supports the VC-1 video codec and the Windows Media Audio Profession 10 audio codec.

Avid MXF Exporter

The new Avid MXF exporter leverages the Avid Media Toolkit to provide the ability to encode to a wide array of Avid codecs. These codecs include:

- DVCAM
- DVCPro 25
- DVCPro 50
- DVCPro 100
- DNxHD 36
- DNxHD 120
- DNxHD 145
- DNxHD 185
- DNxHD 185X
- DNxHD 220
- DNxHD 220X
- IMX 30
- IMX 40
- IMX 50
- JFIF
- XDCam

Motion-Compensated Temporal Filter (MCTF)

Core MCTF settings	
Filter Strength	0 - Mild
Motion estimation	
Hierarchical Levels	0 - Auto

The motion-compensated temporal filter (MCTF) is an advanced algorithm developed by Harmonic and used in the award-winning Electra line of encoders. The MCTF filter removes non-visible high frequency noise introduced mostly due to high motion in the source. This means you'll be able to get equivalent video quality at lower bitrates because the encoder is not compressing the high-frequency noise. This filter is most effective when the source as high motion, like a basketball game, and the target is low-bitrate such as web or mobile output. The filter strength setting should be set higher for higher levels of motion. It is recommended to leave the motion estimation set to Auto to allow the filter to adaptively change as the source frames vary.

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De-Blocking Filter

| Core Deblocking settings	
Chroma Filtering	☐ Chroma Filtering
Filter Strength	Low ▾

The De-Blocking filter is also developed by Harmonic and used in the Electra line of encoders. Unlike the MCTF filter, the de-blocking filter should be used only if the source content contains blockiness due to previous digital compression. This filter smoothes the edges of the blocks, softening the image but creating a more visually appealing output. It is particularly useful going from interlaced source to progressive output. The filter strength should be raised for source content with more blockiness. It is important to note that this filter is applied before the compression, so it will not reduce blockiness introduced by the encode itself.

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STL Caption Burn-in Video Filter

Video	
STL file	
Reference Time Code	Frame Counter
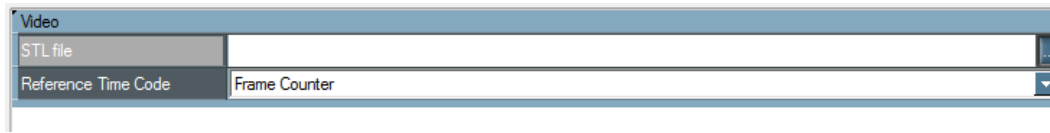
This filter reads an STL file, which contains text for subtitles, and burns them into the output video frames. The time code used to synchronize subtitles can be derived from input file time code tracks or header values, or extracted from SD source files which carry Vertical Interval Time Code (VITC) in the Vertical Blanking Interval (VBI). A zero-offset frame counter can also be used for synchronization.

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VITC Video Filters

Two new video filters, Timecode Extraction – VITC and Timecode Insertion – VITC, enable the reading and writing of timecode from SD source files that have a Vertical Blanking Interval (VBI) section that carries Vertical Interval Time Code (VITC). In addition the Timecode Display video filter has been enhanced with the ability to read the VITC and burn it into the output video frames.

ITU-1770 Audio Filter
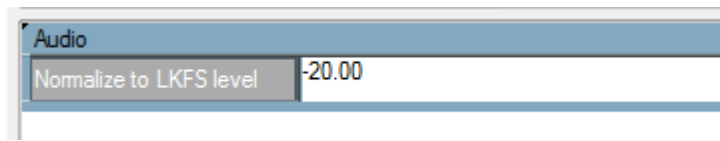
Carbon 3.14 introduces a new audio normalization filter which follows the ITU-1770 specification. It normalizes audio to an LKFS level defined in the UI. This level should be set to within the broadcast delivery requirements of the area the output will be delivered to.

Please visit the ITU Radiocommunications Sector (ITU-R) website for a complete description of the specification: http://www.itu.int/ITU-R/index.asp?category=information&rlink=rhome&lang=en

Rhozet Programming Interface (RPI)

The Rhozet Programming Interface (RPI) is a new API from Rhozet. It allows the creation of 3rd party importers, exporters, and filters for the Carbon transcoding pipeline. The first implementation is the ContentID exporter from Google which allows the creation of fingerprint files for use in their ContentID service (http://www.youtube.com/t/contentid). It has also been used by several other content protection vendors such as Arbitron, Civolution, and Audible Magic. For more information on using the RPI please contact the Rhozet sales department, sales@rhozet.com.

Carbon Farm Manager

The Carbon Farm Manager (CFM) is a service developed to run alongside a Carbon Server Farm. It can be configured to do a variety of management tasks such as gracefully rebooting an entire farm. It does this one node at a time by settings its transcoding slots to 0, waiting for all jobs to finish, rebooting the machine, and then setting the slots back to what they were before the reboot. CFM can also detect and fix problems in a farm such as a stalled Nexus service or a hung job. The Carbon Farm Manager can be downloaded at the link below. Please contact support with any questions regarding configuration or installation of the CFM.

Download: http://www.rhozet.com/Carbon_Farm_Manager.zip

Contact Support: http://www.rhozet.com/support_contact.html

Carbon Farm Analyzer

The Carbon Farm Analyzer (CFA) is a tool designed to give statistics around the performance of a Carbon Server transcoding farm. It can show basic things like responsiveness (ping time), CPU load, and which OS and QT version are installed on all the Agent machines. This tool is very useful when troubleshooting a problem in a large farm. Please contact support for information regarding its installation, configuration, and use.

Download: http://www.rhozet.com/Carbon_Farm_Analyzer.zip

Contact Support: http://www.rhozet.com/support_contact.html