

Comparing and Using Online Video Codecs

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Agenda

- Generic encoding parameters
- Codec vs. platform
- VP6, WMV, and H.264
 - Producing each format
 - Comparing H.264 codecs
 - Comparing VP6, WMV, and H.264 quality
- Comparing sub-\$1,000 encoding tools

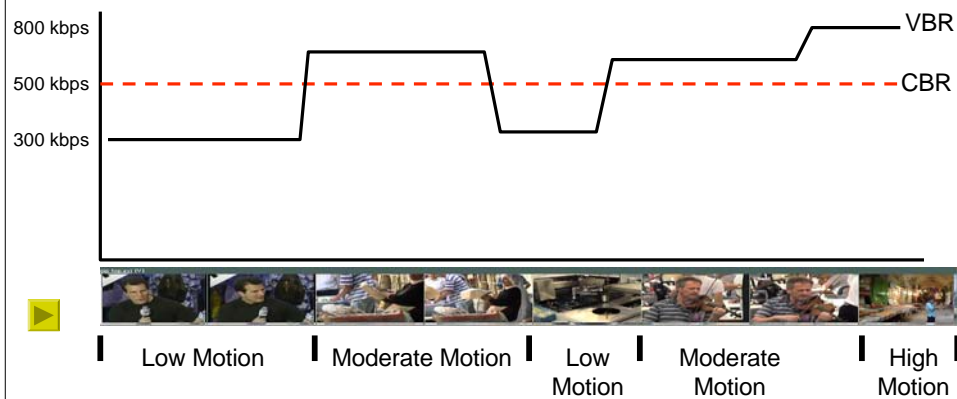


Generic Encoding Parameters



- Terms and techniques
 - Constant and variable bit rate encoding
 - streaming vs. progressive download
 - I, B and P frames

Constant vs Variable Bit Rate



Constant vs Variable Bit Rate



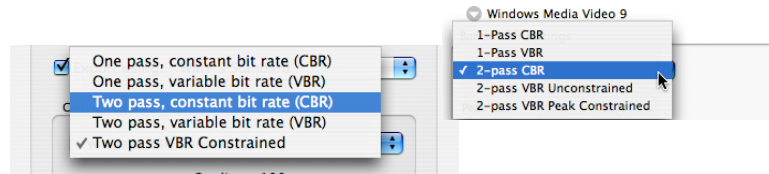
- Constant Bit Rate (CBR)
 - One bit rate applied to entire video, irrespective of content
 - Pros: Easy and fast
 - Cons: Doesn't optimize quality
- Variable Bit Rate (VBR)
 - Dynamic bit rate matches compression complexity (usually motion) in video
 - Pros: Best quality
 - Cons: Slow, can produce erratic stream

When Should I Use VBR/CBR?



- Consider VBR when:
 - Clips are longer than 60 seconds
 - Varied motion in clip (some action, some talking head)
 - Producing for progressive download
 - Encoding time isn't a problem
- Consider CBR when:
 - In a hurry (or live encoding)
 - Producing for streaming
 - Consistent motion (especially talking head)

How do I Produce the Best Quality CBR?

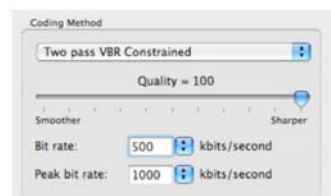
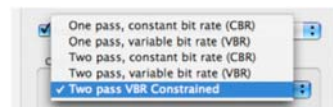


- Use 2-pass CBR
 - Scans file (like VBR), but packs data into a consistent stream
 - Best of both worlds when available
- 1-pass for live or draft work

How Do I Produce the Optimal VBR File?



- 2 passes or more
- Use “Constrained”
 - Constrains to data rate
- Set Target and Max/Min
 - Overall target
 - Max/Peak bit rate-
 - Rule of thumb is 1.5 - 2X
 - Minimum bit rate (not shown)
 - Rule of thumb is .5X unless lots of very low motion



Streaming vs. Progressive Download



- Streaming
 - Distributed by "streaming server"
 - Stream monitored and dished out as needed
- Progressive download
 - Starts playing before fully downloaded
 - Stream pushed out as quickly as possible

Streaming vs. Progressive Download



- When producing for streaming
 - Determine if any unique requirements for server
 - Determine if any unique streaming related features (multi-bit rate files)
 - **Typically, use CBR for steady stream**
- When producing for progressive download
 - Determine if any unique features (fast-start)
 - **Encode using VBR for best quality**

I, B and P Frames

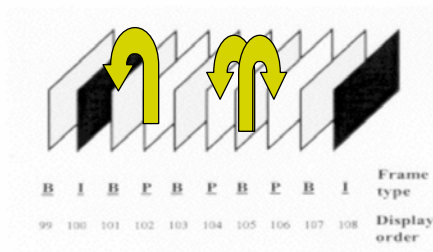


- Defined
- Relevant controls
- A note of caution
 - Frame controls vary by codec and encoder
 - Controls in your program probably won't look like those shown here
 - General principles should work similarly

What are I, B and P Frames?



- I-Frame - encoded without reference to other frames (also called Key Frames)

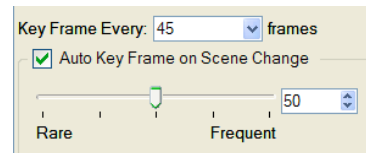


P - looks backward to I and P frames (predicted)
B - looks forward and backward to previous I and P frames (Bi-directional interpolated)
No frames refer to B-Frame

What do I Need to Know About Key Frames?



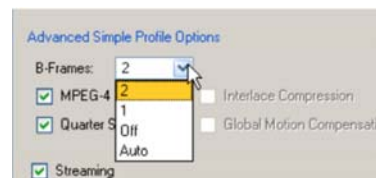
- Key frames help interactivity
 - All playback starts on a key frame
 - When seeking to a random frame, must start playback at key frame
- Key frames help "reset" quality:
 - Useful at scene changes ("Natural" key frames)
- Recommended:
 - Make sure "natural" or equivalent is enabled
 - Go with default duration (5-10 seconds)



What do I Need to Know About B Frames?



- Typically the most "efficient" frame
- Hardest to decode with greatest buffer requirements
 - Usually the key difference between "simple" and "advanced" profiles in MPEG and Windows Media codecs
- Interval is usually the number of B frames between I and P frames.
- 1-3 is recommended



Codec vs Platform



- **Codecs**
 - Can be plugged into a web page, whether designed in HTML, Flash or Silverlight
 - Includes Flash, WMV, VC1, QuickTime
- **Design Environments**
 - Used to create web pages or (increasingly) Rich Internet Applications (RIAs)
 - Includes Flash and Silverlight

Flash vs. Silverlight



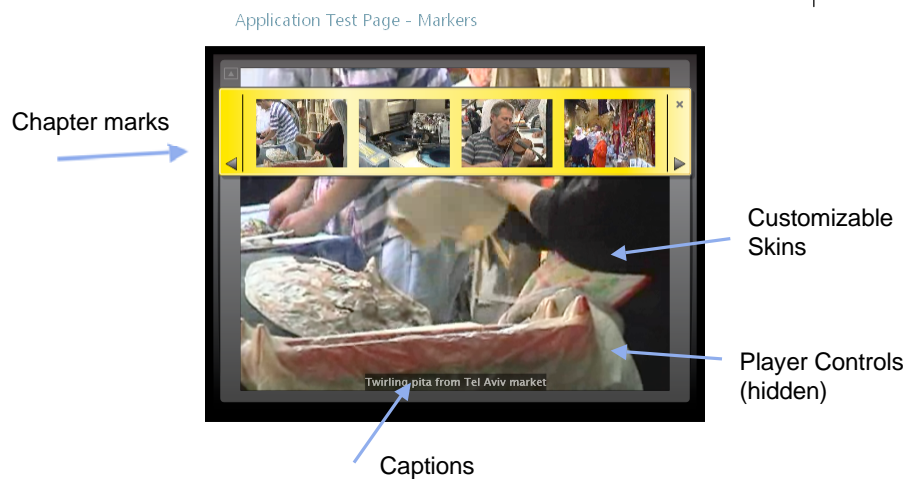
- What is Silverlight
- Flash vs. Silverlight
- What about QuickTime?

What is Silverlight



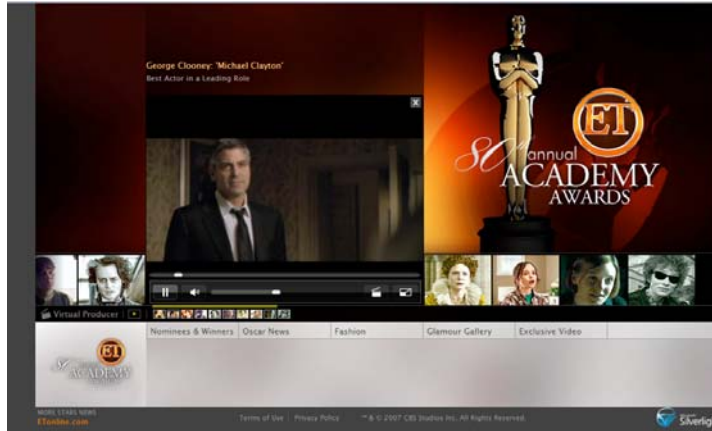
- Player
 - Customizable player for Win/Mac/Linux (via Novell)
 - Relatively small download
 - WMV/VC1 codecs
- Platform
 - Rich design environment with vector-based graphics, media, text, animation, and overlays
 - Flexible programming model that supports AJAX, Microsoft Visual Basic .NET, C#, Python, and Ruby and integrates with existing Web applications

Silverlight Player



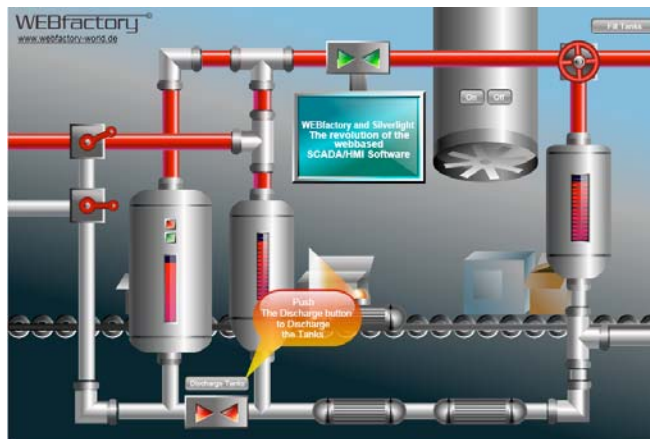
Platform

- Targets same applications as Flash



Platform

- Targets same applications as Flash



Flash vs. Silverlight - Playback



Criteria	Flash	Silverlight
Platforms	Win/Mac/ Linux	Win/Mac/Linux/ Solaris
Codecs	VP6/H.264	WMV/VC1
Penetration	98% 62% - H.264	?/1.5 million/ downloads/day
Play locally	Adobe Media Player	Windows Media Player
iPod/iPhone	VP6 - no H.264 - Yes	No
Cell Phone	Not addressed (but increasingly important)	

Flash vs. Silverlight - Design



Criteria	Flash	Silverlight
Design application	Flash	Expression Studio
Platforms	Win/Mac	Windows
Complementary design tools	CS3	None
Programming Languages	AS3/AJAX	.Net (VB/C#), AJAX, Iron Python, Iron Ruby

Flash vs. Silverlight - Other



Criteria	Flash	Silverlight
Digital Rights Management	Yes	Yes
Live streaming	Nascent but credible (Masters 2008)	Proven
Multi-cast	No	Yes
Multiple bit-rate	Yes	Yes
Server cost	Sub - \$1,000	Free with Windows Server 2008

What's the Net/Net?



- As a player
 - If you currently use WMV files, should consider using Silverlight
- As a design environment
 - Flash is definitely IBM (no one ever got fired for using Flash)
 - Silverlight is getting more mindshare; should know enough to explain why you didn't choose it

What about QuickTime?



- Well featured and affordable server
 - Multi-cast, live and other features
- Great format support
 - iTunes, iPod, iPhone
 - H.264 is the seeming winner
 - Great reputation
- Very small penetration in business and media (other than for movie trailers)

VP6, H.264 and WMV



- Producing VP6
- Producing H.264
 - Choosing the Best H.264 Encoder
- Producing WMV
- Which codec delivers the best quality

What Do I Need to Know About VP6?



- Which codec should I use?
- What do I need to know about producing VP6?
- What's VP6 Cost?

Which Version Should I Use



- Originally one version - VP6
- Now two version
 - VP6-S - Greater encoding/decoding “simplicity,” so HD video can be played by most personal computers
 - Supposed to be 20% less compute intensive during decode
 - VP6-E - Recommended for typical web video delivered at or below 500Kbps

VP6-S vs. VP6-E - Quality



VP6-S vs. VP6-E - Playback



- No noticeable difference on:
 - MacBook Pro (2.4 GHz Core 2 Duo)
 - About 70% processor utilization
 - HP xw4100 (3.0 GHz Pentium 4 with HTT)
 - About 44-54% utilization
- Perhaps difference more noticeable at 1080i
- Run your own tests - if you don't experience a noticeable difference with your configuration, use VP6-E

VP6 Encoding Alternatives



- On2's VP6 with 2-pass VBR
 - Best quality, especially with mixed motion footage
 - Very slow (single threaded)
 - Usually a price premium
- Adobe's single pass CBR
 - Quality suffers slightly in high motion footage
 - Encoding is much faster (multi-threaded)
 - Encoding tools are usually cheaper

VP6 Encoding - Alternatives



- Slight difference noticeably mostly with very high motion footage

What's VP6 Cost?



- Encoding costs only (very simple model)
 - Built into standalone encoder cost
 - Built into server-based engine

What Do I Need to Know About H.264?



- Getting to know H.264
- Flash and H.264
- What's H.264 cost?
- Should I use MPEG-4 or H.264?
- What are the H.264 extensions?
- What are H.264 profiles and levels?
- Which H.264 codec produces the best quality?

Getting to Know H.264



ITU – International Telecommunications Union Telephone, Radio, TV		ISO – International Standardization Organization Photography, Computer, Consumer Electronics	
1984	H.120		
1990	H.261 – Video Conferencing		
1993		MPEG-1 – Video CD	
1994	(H.262)	MPEG-2 – Digital Cable and Satellite TV	
1995	H.263 – Improved Video Conferencing		
1997		ATSC – U.S. HDTV	
1999		MPEG-4	
2002	AVC (H.264)	AVC (MPEG-4 Part 10)	

- AVC is MPEG-4's most advanced codec (MPEG-4 part 10)
- AVC/H.264 are the same
 - Highest current evolution of MPEG-4 encoding
 - First standard adapted by ISO and ITU
 - About 50% more efficient than MPEG-4

Streamcrest Associates
<http://www.streamcrest.com/SDF%20Final1.pdf>

Flash and H.264



- Flash Player 9 Update 3 contained:
 - Software H.264 decoder (Baseline/Main/High profiles)
 - Supplied by MainConcept
 - Not DivX, H.263 or Sorenson
 - AAC decoder
 - Limited subset of QuickTime support
 - Hardware scaling to full-screen mode
- So:
 - Flash player can play mp4, m4v, m4a, mov and .3gp files
 - Seems best to use FLV format for VP6 and F4V for new H.264 based videos

Flash and H.264



- Why H.264? Infrastructure/Ecosystem
 - Native graphics card support
 - Hardware based H.264 encode
 - Standard is widely adapted
 - AAC audio better quality than MP3
- When will it matter?
 - Flash has traditionally fast adoption cycle
 - 62% H.264 capable by 4/2008
- Royalties may apply

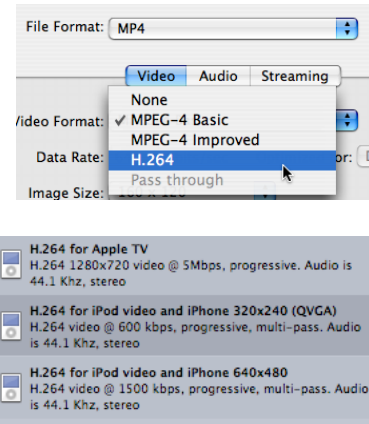
What's H.264 Cost?



- MPEG-LA -
 - "For AVC video delivered via the Internet to an end user who does not pay for the right to view, i.e., neither title-by-title nor subscription, there will be no royalty through December 31, 2010"
 - **Are all AVC essential patents included?** No assurance is or can be made that the License includes every essential patent."
 - AT&T has threatened to sue multiple companies, including Apple over MPEG-4 patents

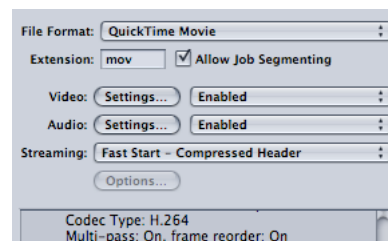
Should I use MPEG or H.264?

- H.264 produces better quality
- Virtually all computers can decode H.264 at this point
- Use H.264 for computers and devices that support H.264 (note Apple presets)
- Use MPEG-4 for other devices or very old computers



What is an MP4 file (and how is it different from MOV)?

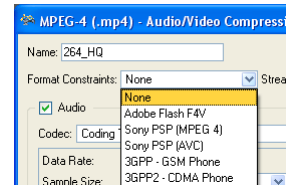
- H.264 file extensions
 - Different “wrappers” for different targets
 - QuickTime Player will play .MP4 files as well as .MOV
 - Common extensions are .m4v and .m4a, and .3GP
- Extension Defaults
 - Most streaming files use MOV
 - Most files produced for devices use .MP4 or derivative
 - Flash is FV4, but will play MP4 and MOV



Customizing for Your Target



- Formats
 - MP4 - official designation (devices other than Apple)
 - M4V - iPod/iPhone/Apple TV
 - MOV - QuickTime streaming
 - FV4 - Adobe Flash
 - 3GP - Phone
- Streaming Requirements
 - QuickTime
 - Hinted streaming for streaming server
 - Fast Start - Compressed Header - progressive D/L
 - Flash - none



What are H.264 Profiles?



- “Define a set of coding tools or algorithms that can be used in generating a bitstream”

	Baseline	Extended	Main	High	High 10	High 4:2:2	High 4:4:4 Predictive
I and P Slices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B Slices	No	Yes	Yes	Yes	Yes	Yes	Yes
Multiple Reference Frames	Yes	Yes	Yes	Yes	Yes	Yes	Yes
In-Loop Deblocking Filter	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CAVLC Entropy Coding	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CABAC Entropy Coding	No	No	Yes	Yes	Yes	Yes	Yes
Interlaced Coding (PicAFF, MBAFF)	No	Yes	Yes	Yes	Yes	Yes	Yes
8x8 vs. 4x4 Transform Adaptivity	No	No	No	Yes	Yes	Yes	Yes
Quantization Scaling Matrices	No	No	No	Yes	Yes	Yes	Yes
Separate Cb and Cr OP control	No	No	No	Yes	Yes	Yes	Yes
Separate Color Plane Coding	No	No	No	No	No	No	Yes
Predictive Lossless Coding	No	No	No	No	No	No	Yes
	Baseline	Extended	Main	High	High 10	High 4:2:2	High 4:4:4 Predictive

Main vs. Baseline



What are H.264 Levels?



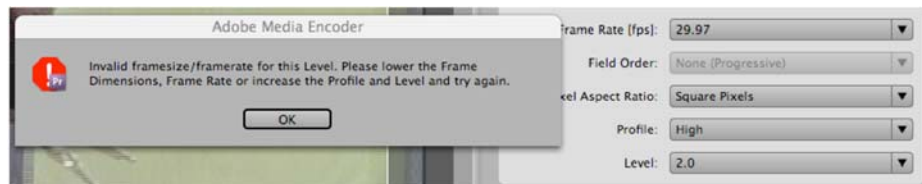
- “Constrains key parameters in the bitstream”

Level number	Max macroblocks per second	Max frame size (macroblocks)	Max video bit rate (VCL) for Baseline, Extended and Main Profiles	Max video bit rate (VCL) for High Profile	Max video bit rate (VCL) for High 10 Profile	Max video bit rate (VCL) for High 4:2:2 and High 4:4:4 Predictive Profiles	Examples for high resolution @ frame rate (max stored frames) in Level
1	1485	99	64 kbit/s	80 kbit/s	192 kbit/s	256 kbit/s	1280x960@30.9 (8) 176x144@15.0 (4)
1b	1485	99	128 kbit/s	160 kbit/s	384 kbit/s	512 kbit/s	1280x960@30.9 (8) 176x144@15.0 (4)
1.1	3000	396	192 kbit/s	240 kbit/s	576 kbit/s	768 kbit/s	176x144@30.3 (8) 320x240@10.0 (3) 352x288@7.5 (2)
1.2	6000	396	384 kbit/s	480 kbit/s	1152 kbit/s	1536 kbit/s	320x240@20.0 (7) 352x288@15.2 (6)

H.264 Levels



- Encoding tools won't let you exceed these levels



Producing H.264 Video



- When producing for a “device” (iPod/iPhone), produce using appropriate profile
 - Usually templates select proper profile
- When producing for general computer playback
 - Use highest profile that enables smooth playback on targets

H.264 Playback - SD File



	Dell Latitude	HP xw4100	MacBook Pro	Dell Precision 390
	1600 MHz Pentium M	3.0 GHz P4 with HTT	2.4 GHz Core 2 Duo	3.0 GHz Core 2 Duo
SD Tests				
H.264 - Main - tricked out (QT Player)	64-88%	13-25%	18-29%	8-12%
H.264 - Baseline (QT Player)	43-80%	19-30%	12-19%	4-8%

H.264 Playback - 720p File



	Dell Latitude	HP xw4100	MacBook Pro	Dell Precision 390
	1600 MHz Pentium M	3.0 GHz 4 with HTT	2.4 GHz Core 2 Duo	3.0 Ghz Core 2 Duo
HD Tests				
H.264 - High	75-99%	46-78%	35-50%	17-28%
H.264 - Baseline	100%	31-68%	44-58%	14-21%

H.264 Playback - 1080i File



	Dell Latitude	HP xw4100	MacBook Pro	Dell Precision 390
	1600 MHz Pentium M	3.0 GHz P 4 with HTT	2.4 GHz Core 2 Duo	3.0 Ghz Core 2 Duo
HD Tests				
H.264 - Main - tricked out (QT Player)	100%	55-69%	42-48%	31-40%
H.264 - Baseline (QT Player)	100%	65-79%	29-42%	22-26%

Producing H.264



- Producing for computer playback
 - Use highest profile that enables smooth playback on your target computers
 - Rule of thumb
 - SD Video - Main or High
 - 720p - Target dependent
 - 1080i - Baseline

The Best H.264 Codec?



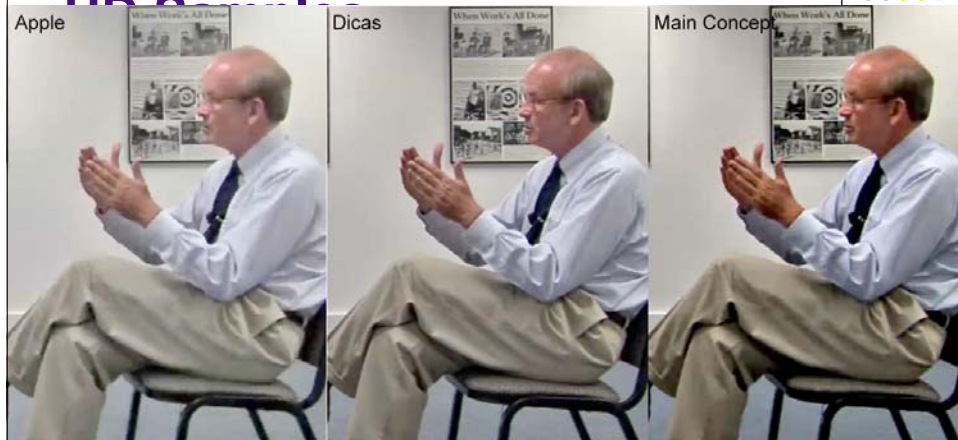
- Test description
 - Apple, Dicas (Episode Pro), Main Concept (Carbon Coder/Squeeze)
 - Three files
 - SD - 640x480@30 fps, 468/32, 2-pass VBR, highest supported profile/quality options
 - HD - 1280x720@30 fps, 800/128, 2-pass VBR, highest supported profile/quality options
 - Screencam - 1024x768@15 fps, 200/32, 2-pass VBR, highest supported profile/quality options

HD Test Results



	Apple	Dicas	Main Concept
Still Quality	3	2	1
Motion Quality	3	2	1
Smoothness	1	1	1
Total	7	5	3

Lower score is better



- All codecs perform well with low motion footage



HD Samples



- Walking around (and panning) tends to separate the contenders (note detail in curtain)



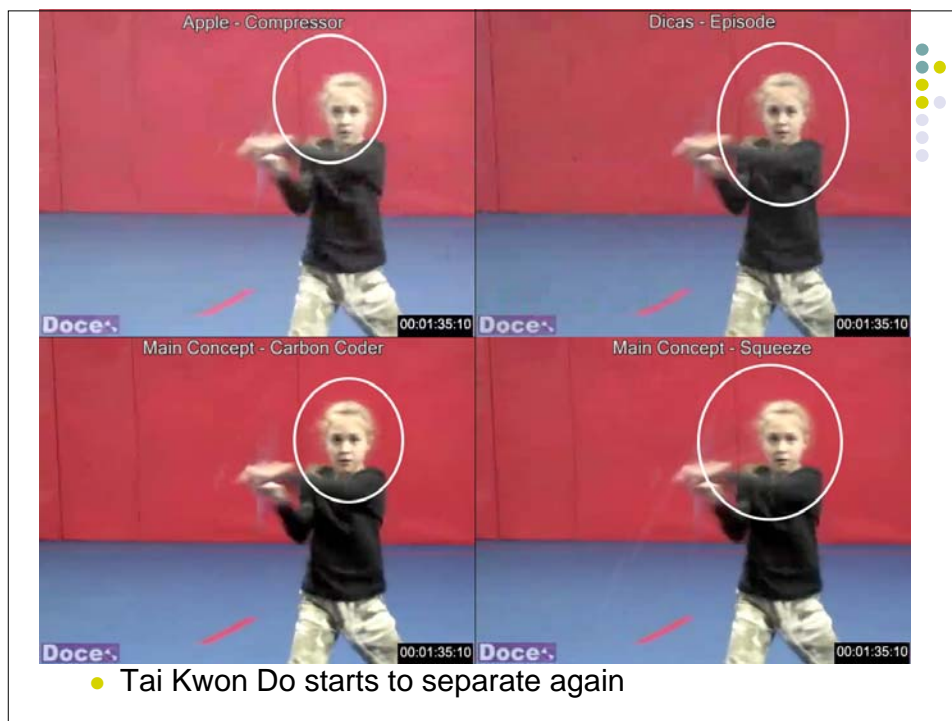
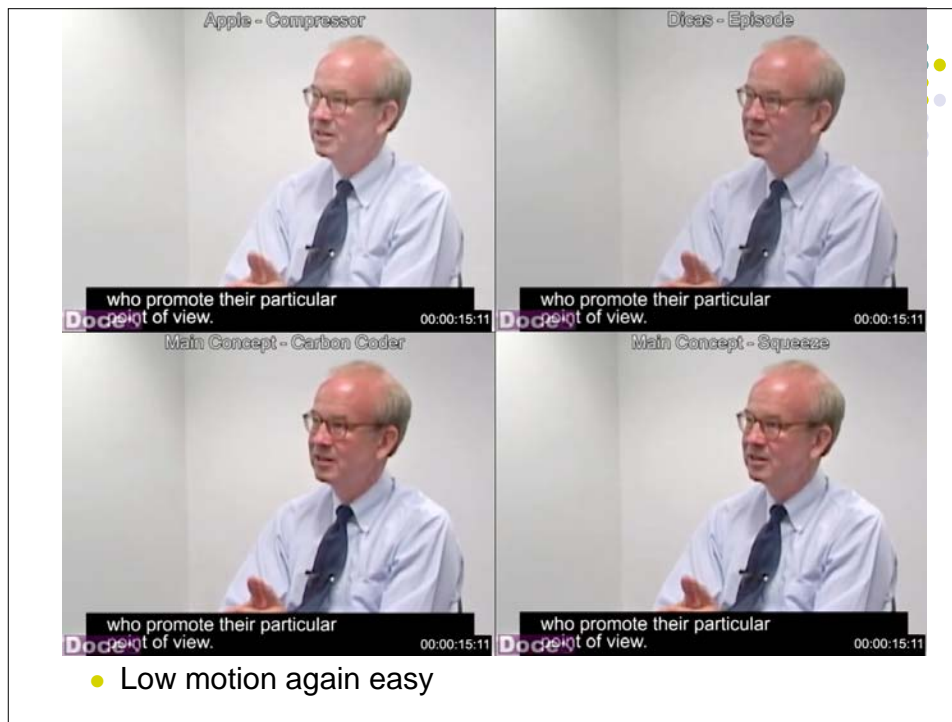
- Jumping further separates the contenders

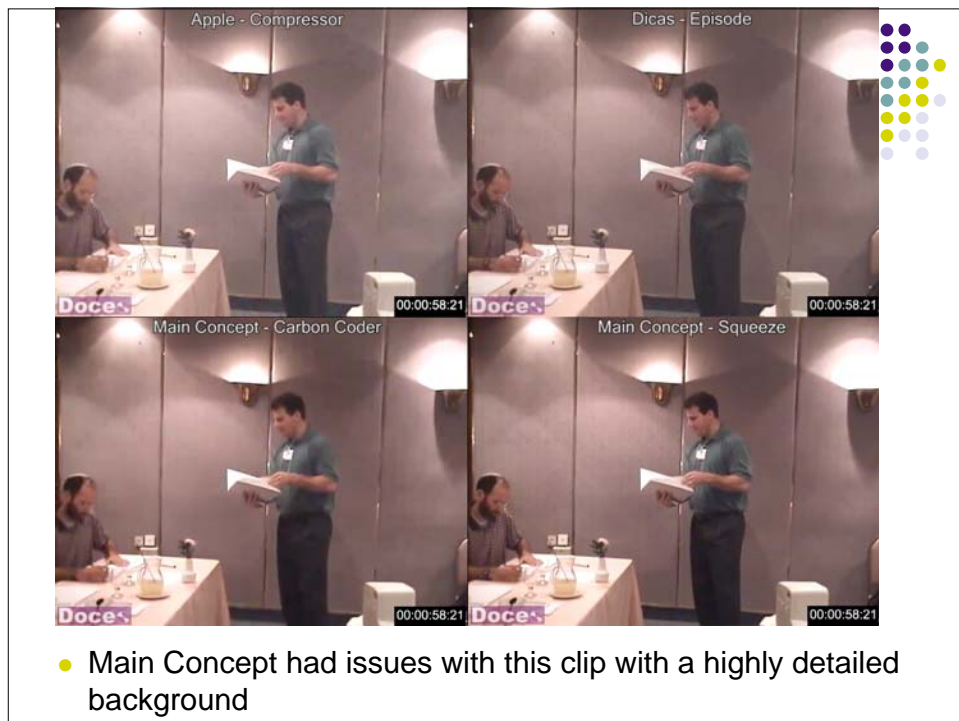


SD Test Results

	Apple	Dicas	Main Concept
Still Quality	3	2	1
Motion Quality	3	2	2
Smoothness	1	1	1
Total	7	5	4

Lower score is better



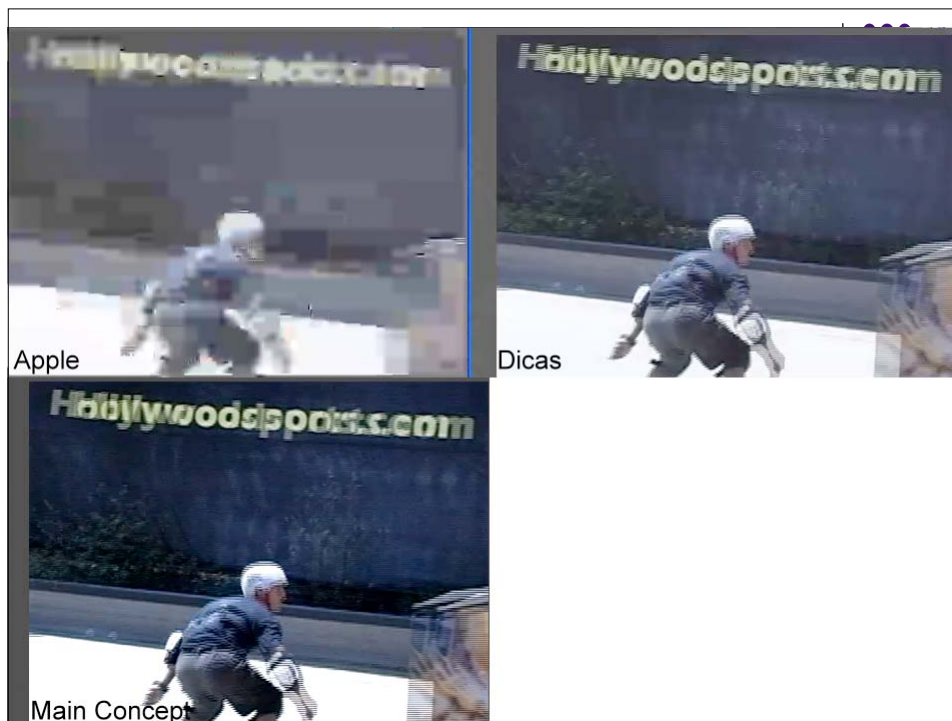


Screencam Test Results



	Apple	Dicas	Main Concept
Still Quality	3	1	1
Motion Quality	3	2	2
Smoothness	1	1	1
Total	7	4	4

Lower score is better



Overall Results



	Apple	Dicas	Main Concept
HD	3	2	1
SD	3	2	1
Screencam	3	1	1

Where to Find Them?



- #1. Main Concept
 - Adobe, Rhozet, Sorenson
- #2. Dicas
 - Episode Pro
- #3. Apple
 - Compressor, ProCoder

What Do I Need to Know About Windows Media?



- How do I get the latest codecs?
- What's VC-1 and how does it relate to WMV9?
- What's VC-1 cost
- What are the relevant Windows Media profiles
- How can I “tweak” Windows Media video files for maximum quality?

How Do I Get the Latest Codecs



- Updated codecs installed with either:
 - Media Player 11
 - The Windows Media Format SDK 11
(<http://msdn2.microsoft.com/en-us/library/aa387410.asp>)
- Does it matter?
 - Yes - codec quality has noticeably (if not significantly) improved

What's VC-1 and WMV?

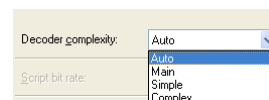
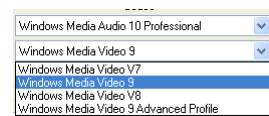
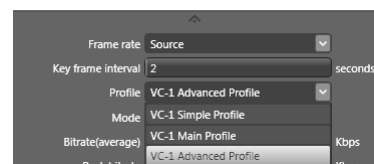


- What is VC1?
 - A SMPTE standard codec largely developed by Microsoft.
- What is WMV9?
 - Microsoft's implementation of VC1
 - Simple, Main and Advanced Profiles

Getting to Know VC1



- Codec selection can be confusing
- Expression Encoder calls all codecs VC1
- WME calls them WMV9 (simple and Main) and WMV 9 Advanced Profile



What's VC-1 Cost?



- MPEG-LA -
 - In the case of VC-1 delivered via the Internet to an End User who does not pay remuneration for the right to receive or view, there will be no royalty during the first Term of the License (ending December 31, 2012)
- **Are all AVC essential patents included?** No assurance is or can be made that the License includes every essential patent."
 - Couldn't find any current lawsuits (as with H.264)

What are the Windows Media Profiles?



- Now two profiles
 - Main - backwards compatible, no codec update required
 - Advanced Profile
 - Supports interlaced video (for Blu-ray)
 - Not backwards compatible, codec update (not player update) required
 - Problem for locked down corporate environments
 - Problem for off-line viewing

Usage Cases



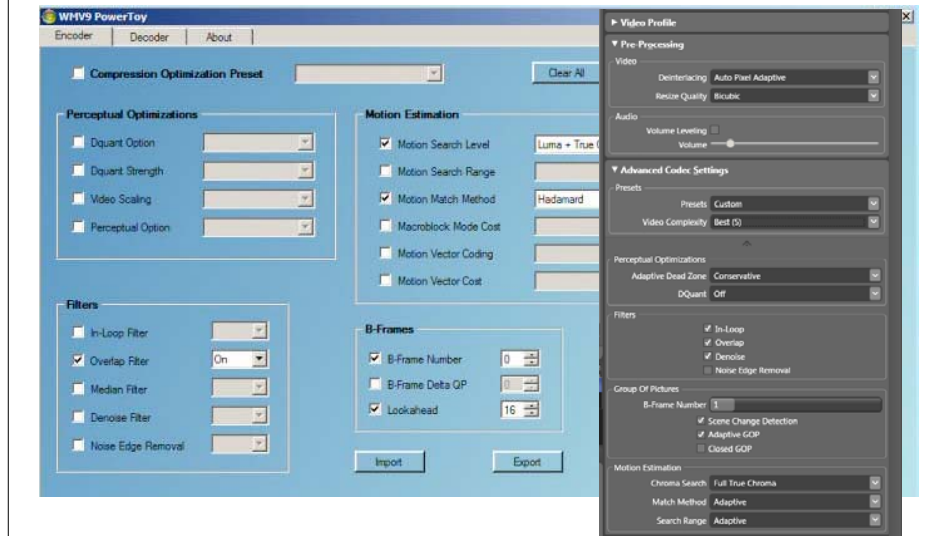
- WMV 9 /VC1-Advanced Profile
 - Always use for interlaced output (Blu-ray DVDs)
 - Always use when tweaking encoding parameters (more later)
- WMV 9/VC1-Main/Simple
 - Progressive output where no tweaking
 - Use Main unless targeting lower power devices like cell phones

How Can I Tweak WMV Files for Maximum Quality?



- Both profiles have advanced encoding parameters that you can access:
 - Via command line
 - Manual registry changes
 - Registry changes via the “PowerToy” tool
 - Direct program support:
 - MS Expression Encoder 2
 - Rhozet Carbon Coder
 - Inlet Semaphore/Digital Rapids

Optimizations



Should I Tweak?

- Does tweaking improve quality?
 - Yes, in some well defined cases, but tough to find a “one-size fits all video” tweak
 - Most effective when repeatedly producing similar videos (same set, lighting, etc.)

More on Tweaking



- If you don't tweak, the Main and Advanced Profiles produce equivalent quality
- Some critical tweaks are only supported in the Advanced Profile, so if you're going to tweak, use the Advanced Profile

Tweaking Resources



- Articles
 - My review of PowerToy and SDK 11
<http://www.streamingmedia.com/r/printerfriendly.asp?id=9659>
 - Ben Waggoner's article on tweaking
<http://www.streamingmedia.com/r/printerfriendly.asp?id=9456>
- Downloads
 - PowerToy - <http://www.citizeninsomniac.com/WMV/>
 - Windows Media Format SDK 11 <http://msdn2.microsoft.com/en-us/library/aa387410.aspx>
 - Waggoner SME Presentation (page 24-42)
www.streamingmedia.com/east/SMEast2007-Waggoner-Webcasting.PDF

The Best Quality Codec



- Codecs
 - On2 VP6 (Flix Pro)
 - H.264 (Main Concept Codec, Carbon Coder)
 - Windows Media Video (Expression Encoder 2)
- Important announcement
 - On2 announced 40% increase in quality in soon to be released codec
 - These tests **DO NOT** include the updated codec

Test Files



- SD - 640x480@30 fps, 468/32, 2-pass VBR, highest supported profile/quality options
- HD - 1280x720@30 fps, 800/128, 2-pass VBR, highest supported profile/quality options
- Screencam - 1024x768@15 fps, 200/32, 2-pass VBR, highest supported profile/quality options

HD Test Results



	H.264	VC1	VP6
Still Quality	1	3	2
Motion Quality	2	3	1
Smoothness	1	1	1
Total	4	7	4

- Lower scores better

HD Caveats



- Tests ridiculously aggressive; at 1500 kbps, they all look good



HD Samples



- Note the detail preserved by VP6 and especially H.264

SD Test Results



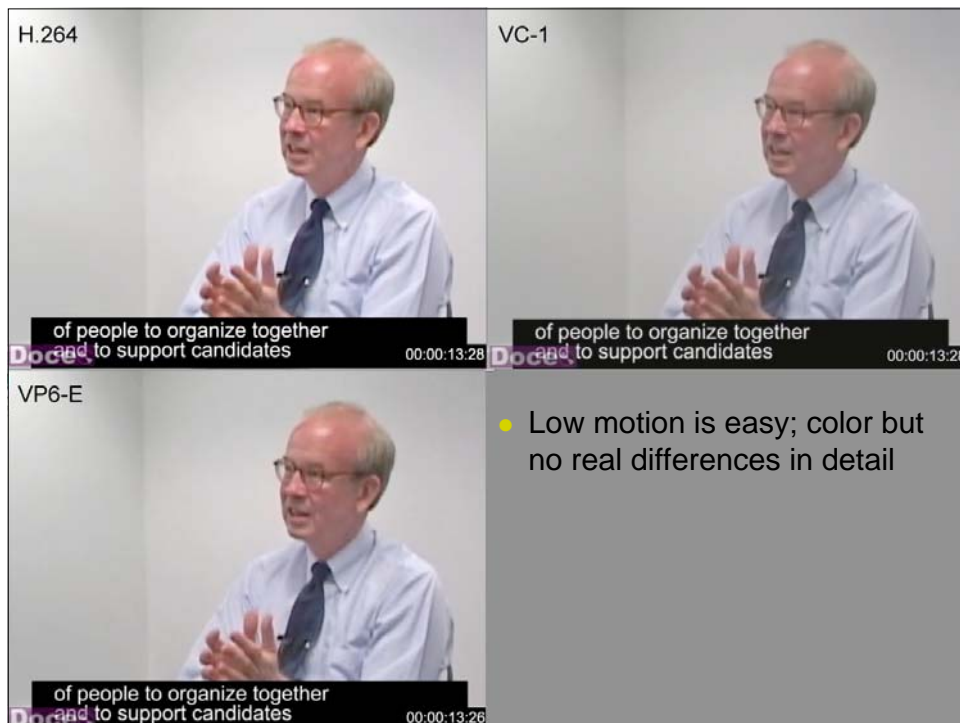
	H.264	VC1	VP6
Still Quality	1	3	2
Motion Quality	2	1	3
Smoothness	1	3	1
Total	4	7	6

Lower score is better

SD Caveats



- Tests very aggressive; difference at higher data rates would be much less
- Differences modest even at these data rates
- Most viewers wouldn't notice absent side by side comparisons





Screencam Test Results



	H.264	VC1	VP6
Still Quality	1	3	2
Motion Quality	1	3	2
Smoothness	1	1	1
Total	3	7	5

Lower score is better

General

Editing Mode: Desktop

Timebase: 29.97 frames/second

H.264

Playback Settings...

Video

Frame Size: 1440 horizontal 330 vertical 4:3

Pixel Aspect Ratio: Square Pixels (1.0)

Fields: No Fields (Progressive Scan)

Display Format: 30 fps Drop-Frame Timecode

Title Safe Area: 20 % horizontal 20 % vertical

Action Safe Area: 10 % horizontal 10 % vertical

Audio

Sample Rate: 48000 Hz

Display Format: Audio Samples

General

Editing Mode: Desktop

Timebase: 29.97 frames/second

VC-1

Playback Settings...

Video

Frame Size: 1440 horizontal 330 vertical 4:3

Pixel Aspect Ratio: Square Pixels (1.0)

Fields: No Fields (Progressive Scan)

Display Format: 30 fps Drop-Frame Timecode

Title Safe Area: 20 % horizontal 20 % vertical

Action Safe Area: 10 % horizontal 10 % vertical

Audio

Sample Rate: 48000 Hz

Display Format: Audio Samples

General

Editing Mode: Desktop

Timebase: 29.97 frames/second

VP6-E

Playback Settings...

Video

Frame Size: 1440 horizontal 330 vertical 4:3

Pixel Aspect Ratio: Square Pixels (1.0)

Fields: No Fields (Progressive Scan)

Display Format: 30 fps Drop-Frame Timecode

Title Safe Area: 20 % horizontal 20 % vertical

Action Safe Area: 10 % horizontal 10 % vertical

Audio

Sample Rate: 48000 Hz

Display Format: Audio Samples

- H.264 is the clear winner

Overall Results



	H.264	VC1	VP6
HD	1	3	1
SD	1	3	2
Screencam	1	3	2

Choosing a sub \$1,000 Batch Encoder



- What's covered
 - Quality and features of Apple Compressor, Grass Valley ProCoder, Microsoft Expression Encoder 2, On2 Flix Pro, Sorenson Squeeze, Telestream Episode Pro
- What we don't cover
 - Hardware encoders, server-based encoding, server farms

Meet the Contestants



Product	Version/Price
Expression Encoder	\$199
Apple Compressor	Suite
ProCoder	ProCoder, \$499
On2 Flix Pro	Flix Pro (\$249), Flix Exporter (\$199), Flix Engine (annual fee)
Sorenson Squeeze 5	Squeeze 5 for Flash (\$199), Flash Pro (\$299), Squeeze 5 (\$499), Pro \$599), Pro for Mac (\$799)
Telestream Episode	Episode (\$395), Episode with Flash 8 (\$495), Episode Pro (\$895), Pro with Flash 8 (\$995)

OS Support



Product	Supported OS
Expression Encoder	Windows
Apple Compressor	Mac
ProCoder	Windows
On2 Flix Pro	Windows/Mac
Sorenson Squeeze	Windows/Mac
Telestream Episode	Mac

Output Format Support



Product	Supported Output
Expression Encoder	Windows Media
Apple Compressor	H.264, Windows Media*, Flash*
Grass Valley ProCoder	H.264, Windows Media, Flash*
On2 Flix Pro	Flash only
Sorenson Squeeze	H.264, Windows Media, Flash*
Telestream Episode	H.264, Windows Media, Flash

Automation Definitions



- Batch - queue multiple files for encoding
- Watch folders
 - Set up process that automatically starts encoding a file copied to a watch folder
 - Great network sharing feature
- Droplets
 - Create desktop icon that triggers drag and drop encoding
- Profiles - (ProCoder)
 - One profile that contains multiple presets

Automation



Product	Features
Expression Encoder	Batch
Apple Compressor	Batch, Droplet
Grass Valley ProCoder	Batch, droplet, watch folders, profiles
On2 Flix Pro	Batch*
Sorenson Squeeze	Batch, watch folder
Telestream Episode	Batch, watch folder (with Engine)

Scalability



Product	Features
Expression Encoder	None
Apple Compressor	Cluster encoding
Grass Valley ProCoder	Rhozet Carbon Coder
On2 Flix Pro	Server-based products
Sorenson Squeeze	Squeeze Excel (MPEG-2/H.264 hardware), \$6,499
Telestream Episode	Engine (\$3,450), Engine Pro (\$7,950)

Deinterlacing Quality



Product	Features
Expression Encoder	Good
Apple Compressor	Best - very, very good, glacial Better - good, fast
Grass Valley ProCoder	Good
On2 Flix Pro	Fair
Sorenson Squeeze	Fair - Avoid if possible
Telestream Episode	Very good
Notable others	Avoid - WME, Flash 8

Deinterlacing Comparisons



Deinterlacing Summary



- Recognize aliasing artifacts as signs of suboptimal deinterlacing, not codec
- Don't deinterlace in WME or Flash 8
 - Scale and deinterlace in your video editor, producing an "intermediate" file to import into your compression program
- Squeeze is on the bubble quality-wise; aliasing can get noticeable
 - Ditto

Quality Results



- H.264
- VP6
- Windows Media

Quality Tests



- SD File
 - 500 kbps@30 fps
 - 640x480 resolution
 - 468 kbps 2-pass CBR/32 kbps audio WMV/H264
 - Flash - VP6 - 2-Pass VBR (when available)
 - File sizes within 5%

H.264 Encoding Features



Tool	Codec	Hint for Streaming	Fast Start	F4V format	2 Pass CBR
Apple Compressor	Apple	Yes	Yes	No	Yes
Grass Valley ProCoder	Apple	Yes	?	No	Yes
Sorenson Squeeze	Main Concept	Yes	Yes	Yes	Yes
Telestream Episode	Dicas	Yes	Yes	No	Yes

H264 Comparisons



H.264 Summary



Encoder	Quality	Comments
Compressor		
ProCoder		
Squeeze		
Episode Pro		

VP6 Encoding Features



Tool	Batch	De-int	VP6	E/S	2 Pass
Flash 8/9 Video Encoder	Yes (F only)	No/ Yes	Yes	No	No
CS3 Flash Video Encoder	Yes (F only)	Yes	Yes	No	No
Premiere Pro/After Effects	No	Yes	Yes	No	No
Sorenson Squeeze	Yes	Yes	Yes	Yes	Yes
On2 Flix Pro	Yes (F only)	Yes	Yes	Yes	Yes
Episode Pro	Yes	Yes	Yes	Yes	Yes
Flix Exporter (apps below)	Yes	Yes	Yes	Yes	Yes

Discreet Media Cleaner, Canopus Pro Coder (VP6 for Flash video only), QuickTime Pro, Adobe After Effects, Apple Final Cut, and Apple Compressor

VP6 Quality Comparisons



Encoder	Rating	Comments
Compressor		
ProCoder		
Flix Pro		
Squeeze		
Episode Pro		

WMV Encoding Features



Tool	Multiple Bitrate	SDK 11 Tweaks
Expression Encoder 2	Yes	Yes
Apple Compressor	No	No
Grass Valley ProCoder	Yes	No
Sorenson Squeeze	Yes	No
Telestream Episode	Yes	No

Windows Media Comparisons



Which WMV Encoder is Best?



Encoder	Rating	Comments
Compressor		
Expression Encoder 2		
Episode Pro		
Squeeze		
ProCoder		

Questions?

