Encoding Video for the Web

Presenters:
Robert Reinhardt - VideoRX.com
Larry Kless - OnlineVideoPublishing.com

Moderator – Mark Robertson, ReelSEO

Audio Portion:
Canada: 1416-900-1162
United Kingdom: 44 (0) 121 368 0265
United States: 1 323 417 4600
Access Code: 600-886-533
Agenda

• Encoding 101
  • What is video compression?
  • What is bit rate?
  • Video codecs vs. container formats
• Shooting tips for web video
• Tools and resources for encoding
• Tutorial: Create high-quality H.264 encoding settings
• Discussion & Q/A

Download presentation @ tinyurl.com/reelseo-slides/
Larry Kless – Online Video Publishing Genius

- President and Founder of [Online Video Publishing](http://onlinevideopublishing.com)
- 20 year veteran of the enterprise video space
- Award-winning producer of corporate and educational videos
- He writes a [personal blog](http://example.com) and is a contributor on ReelSEO, Vator.tv and other online video blogs
- Awarded 2009 Streaming Media All-Star
- Frequent speaker/moderator at industry events and webinars
- Co-chair of the 2009 Online Video Platform Summit
- Long-time member of Canyon Cinema, Inc. and Filmmakers’ Coop
Robert Reinhardt – Flash & Encoding Ninja

- Creator of service videoRx.com ”Prescription Encoding”
- VP of the multimedia consulting company, [the MAKERS]
- Expert on multimedia application development and online video deployment (particularly in Adobe Flash and H.264)
- Author of the first 7 editions of the Flash Bible series (Wiley), as well as Video with Adobe Flash CS4 Professional Studio Techniques (Adobe Press)
  - Over 200,000 copies sold worldwide in over 13 languages
- Featured speaker at FlashForward, FITC, Flashbelt, Flash on the Beach, SIGGRAPH, and Adobe MAX conferences
- Robert is also an instructor at DesignProVideo.com
What Producers Need to Know About VIDEO COMPRESSION

Larry Kless - Online Video Publishing [dot] com
What is Video Compression?

- Compression is central to the video production workflow
- Video and audio streams are compressed, contained and output as files
- Compression reduces the amount of data
  - Redundant information is removed to reduce the storage and bandwidth
- Combo of spatial image compression + temporal motion compensation
- Quality is reduced as the file gets more compressed
**Video Codecs and Containers**

**Common Codecs**
- DV/DVCPRO
- Sorenson Spark
- On2 VP6-S
- H.264/MPEG-4 AVC
- Theora (.ogv, .oga)
- VC1
- MP3, AAC (audio)

**Common File Containers**
- MOV
- FLV
- MP4, M4V
- OGG
- 3GP, 3G2 (mobile)
- MP3, M4A, MP4 (audio)

* MPEG-2 is both a codec and a container

I need a **MP4 file using H.264 encoding compressed at 700 Kbps and AAC audio at 64 Kbps.**
What is a Video Codec?

- **Codec = compressor/decompressor**
  - The software or hardware engine that converts uncompressed frames into the compressed domain (vice versa)
  - Codecs can be both lossy or lossless (typically lossy)
  - Reduction in information at each encode

- Typically asymmetrical
  - Decompression is often >10x faster than compression

- Example “lossy” codecs
  - H.264, VP6, VP8, Divx, MPEG-4, FFMPEG, Sorenson Spark, VC1, VOB

- Inter-frame (acquisition and editing formats)
  - DV, MPEG-2 (IMX), AVC-Intra, JPEG-2000

- Intra-frame compression (distribution formats)
  - H.264, MPEG-2 LongGOP, WMV, VP6, etc...
What is Bit Rate?

- Bit rate (AKA data rate) = amount data that is transferred per second
  - Kilobits per seconds (Kbps)
  - Megabits per second (Mbps)

- Higher data rate = less video compression = higher quality = larger files

- Lower data rate = more video compression = lower quality = smaller files

- For smooth video streaming playback, data rate must conform to available bandwidth (i.e. size of the pipe or storage size of physical media)

- Variable (VBR) vs. constant (VBR)
What is a Video Container?

• AKA “wrappers”

• Can contain:
  – Multiple types of codecs (audio, video, etc…)
  – Animation, music, speech, text, subtitles, etc…

• Used to identify, interleave, and synchronize the various components
  – Critically important for successful playback
  – Most device or distribution mediums are in the container specifications
  – Single biggest source of incompatibility is in containers rather than codecs

• Example containers
  – MOV, AVI, OGG, MP4, WMV, FLV
What is a Video Format?

Combination of a **container** and a specified set of **codecs** and **metadata**

- Example: MP4 with H.264 video and AAC audio

- Detailed parameters
  - MP4 container
  - H.264 codec
    - 720x480, 29.97fps, upper field first
    - 2-pass VBR, 3 Mbps data rate,
    - Main profile, ATSC closed-captioning
    - ...and about 50 other parameters
  - AAC audio
    - Stereo, 16-bits per sample, 48Khz sample rate
    - 128 Kbps data rate
What is Aspect Ratio and Display Resolution?

- **Aspect ratio** = Ratio of the width of the image to its height
- **Display resolution** = # of pixels in each dimension

### Standard definition = 4:3
- **QVGA**
  - 320x240
- **VGA**
  - 640 x 480
- **NSTC**
  - 720 x 480

### Widescreen = 16:9
- 640x360
- 1280 x 720 (HD)
- 1920 x 1080 (1080 HD)
Is Encoding the Same Thing as Transcoding?

Answer: NO

- **Encoding** = Outputting a file or video stream into a format using a specific codec profile
- **Transcoding** = Converting one file format to another (e.g. WMV to FLV)

Tips for better quality

- Always start with a high quality source (e.g. directly from your video master, editing program or video file)
- If you have a DVD master and plan to edit, rip it without video compression (e.g. 8-bit uncompressed vs. H.264)
- Every time you recompress a video file you reduce the quality (think copy of a copy of a copy)
Important points to remember

• Motion degrades video quality

• Bandwidth and delivery
  – Progressive download
  – Streaming

• May need high and low quality versions

• The greater the complexity of image
  = the greater the loss of detail
Choosing a Format

• Before you start, you must learn
  – Who your audience is
  – What do they want to see
  – How do they want to see it
  – What’s the business application

• Once you know, you can decide
  – File format
  – Resolution
  – Compatibility
  – Distribution and syndication
Shooting for Web Video - 4 Need to Knows

Watch the amount of motion
- Limit camera motion
- Cuts compress better than dissolves

Manage your backgrounds carefully
- The best backgrounds have no motion and low detail
- Don’t use high contrast colors or wide open spaces
- Break up the background with some texture

Lighting is key
- Use soft lights to reduce artifacts and noise
- Create contrast between subject and background
- Both 3-point and flat lighting work well for web video

Shoot in progressive mode (p) vs. interlaced (i)
My Export Settings for Corporate Intranet

**Medium quality**
- Encode video for Flash 9 player
- Video codec: VP6 @ 400-500 Kbps, 2-pass VBR
- Audio codec: MPEG Layer III @ 64 Kbps, 22 kHz mono
- Advanced settings: 30 Fps, Aspect ratio: 640 x 480 pixels, cropping, deinterlace, Key frame placement: Automatic

**High quality**
- Video codec: H.264 @ 700 Kbps – 1 Mbps
- Audio codec: AAC @ 80 Kbps, 44.1 kHz stereo
- Advanced settings: 30 Fps, Aspect ratio: 640 x 360 pixels, Key frame placement: Automatic

*Videos are wrapped in JW Player and deployed to web server and delivered via progressive download*
My Export Settings for Uploading

Export using QuickTime

– Encode video for MP4
– Video codec: H.264 @ 3000 Kbps
– Audio codec: AAC @ 128 Kbps
– Advanced settings:
  • 30 Fps, Aspect ratio: 1280 x720, Key frame placement: Automatic

Upload to Tubemogul

– Distribute to YouTube, Blip, Dailymotion, Viddler, Vimeo, Yahoo
Try the Bit Rate Calculator

http://tinyurl.com/bitrates-calc
Tools & Options for Encoding Video

• Editing software

• Desktop encoding software
  – Sorenson Squeeze
  – Flix Pro
  – Adobe Encoder
  – Compressor / Mac
  – Handbrake
  – QuickTime Pro

• Web-based encoding tools
  – Encoding.com
  – VideoRX.com

• Video hosting platforms
  – BitsOnTheRun, BrightCove, Fliqz, Kaltura, Ooyala, Sorenson 360, Vzaar, etc... 70+ Visit
TUTORIAL: CREATE HIGH-QUALITY H.264 ENCODING SETTINGS

Robert Reinhardt
Free Tools for H.264 Encoding

• x264: Open source encoding library

• ffmpeg: Open source command line encoding tool

• Handbrake: Open source GUI tool for x264 and ffmpeg, available for download at http://www.handbrake.fr

• Web Video Bitrate Starter: My encoding preset tool, available for download at http://flashsupport.com/resources
• x264 can produce higher quality output for equivalent file sizes (or bit rates) than most commercial encoding products

• x264 requires a more thorough understanding of intricate H.264 settings that other encoders might automate behind the scenes

• Some H.264 encoding options may not significantly enhance quality with drastic reductions in bit rate
[DEMO: HQ H.264 for web desktop destination]
Thank You

• Follow Robert on twitter: @flashfreaker

• Read my blog post: http://tinyurl.com/whyflash

• Latest project: videoRx.com, online encoding service

• Training:
  – Esynctraining.com

• Next events:
  – Flashbelt, Minneapolis, June 13-16
  – Flash on the Beach, Brighton, UK, September 26-29
Q & A
Bookmark ReelSEO = Video Marketing News, Trends, Tips...

Thank You
Mark R. Robertson, Founder
www.reelseo.com

@reelseo
Facebook.com/reelseo