Choosing an Enterprise Encoder

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Agenda

- What’s covered (and what’s not)
- What is an enterprise encoder
- Classes of enterprise encoders
- Points of differentiation (factors to consider when choosing an enterprise encoder)
What’s covered (and what’s not)

- On-demand encoding only
  - Not live (though many of the lessons and buying considerations are similar)
  - Not video conferencing or conferencing
- For desktop/mobile and compatible markets
  - Not broadcast or cable
  - Not IPTV (though some overlap with OTT)
- Local installation (not cloud)
What is an Enterprise Encoder?

- How is Squeeze Server different than Squeeze, or Episode Engine different than Episode Pro?
- Varies by product, but here are some concepts
What is an Enterprise Encoder?

- **Shared use**
  - Watch folders, UI, API

- **Highest performance**
  - Full parallel encoding/split and stitch
    - How Episode Engine differs from Episode Pro

- **Scalable**
  - Single point of control
  - Multiple encoders with failover
What is an Enterprise Encoder?

- All relevant outputs (video and manifest files)
  - Single file H.264
  - HTTP Live Streaming
  - HTTP Dynamic Streaming
  - Smooth Streaming
  - DASH

- Enterprise features unavailable on desktop products
  - Closed captioning (not universally supported in enterprise products, though should and will be)
  - DRM support for major output formats
What is an Enterprise Encoder?

- Programmable via API/plug-ins
  - How Squeeze Server differs from Squeeze Desktop
- Can be hardware
  - Thomson ViBE EM4000, Envivio 4Caster, Telestream Lightspeed Server
- Can be software
  - Harmonic Carbon Coder, Telestream Vantage, Ateme TITAN KFE
- Can be command line
  - YouTube uses FFMPEG to perform their encoding
Classes of Enterprise Encoder

- Fall into three classes:
  - Important to identify class you’re looking for before getting started
- Class 1: Swiss Army Knife Transcoders
  - All formats in, all formats out
  - Can input and output most camera and intermediate formats
  - Output most codecs, including legacy formats and playout servers
Classes of Enterprise Encoder

- Class 2: High-volume encoders
  - Often limited I/O format support
    - Input
    - Output
  - Fastest possible H.264 encoding
Classes of Enterprise Encoder

- Class 3: Workflow systems
  - Integrate encoding with quality control and other functions
  - Make encoding decisions based upon metadata
    - Interrogate file and place in encoding buckets
    - HD vs. SD, or 16:9 vs. 4:3
  - Perform incoming QC checks
  - Perform post-encoding QC checks
  - Self-healing workflows (encode at higher data rate if quality metrics too low)
Workflow is uber-program that sits above encoding/QC and other programs
Harmonic WFS

- Pre-transcode
  - Find error – email
- De-interlace once
- Encode to 8 targets
- Test each for SSIM/drop frame
  - Success – FTP
  - Failure - email

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bit.ly/Ozer_qctools
Telestream Vantage

Get Height

SD or HD?

Letter boxed?

Yes/No?

Use this preset

Move
Digital Rapids Kayak
Workflow Pro’s and Cons

**Pros**
- More sophisticated workflows
  - Branching
  - QC
  - Self-healing
- Integrated reporting for encoding/QC
  - You can add QC to any system, but reporting is separate and operation not as well integrated

**Cons**
- Cost – WF software is extra
  - Harmonic - $20K
  - Vantage - $7,500
- Complexity
What’s the Point?

- Three types are very distinct, with meaningful pros and cons
- Know which you’re trying to buy on the way in
- Choosing a workflow system can dictate encoder selection:
  - Vantage – Vantage/Vantage Lightspeed
  - Carbon WFS – Carbon Coder or ProMedia Xpress
Who’s Who?

Swiss Army Knife
- Amberfin iCR 1101
- Ateme TITAN KFE
- Thomson ViBE Convergent Video System
- Harmonic Carbon Coder
- Telestream Episode Engine
- Sorenson Squeeze Server
- Digital Rapids Transcode Manager
- Rovi TotalCode
- Vantage Transcode

High Volume Encoders
- Thomson ViBE EM4000
- Envivio 4Caster
- VBrick 9000 Series
- Digital Rapids StreamZ
- Viewcast Niagara 9100
- VBrick 9000 Series
- Haivision Makito
- Vantage Lightspeed

Workflow Systems
- Telestream Vantage
- Harmonic WFS
- Digital Rapids Kayak Workflow Platform

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When to Consider Workflow (or at least QC?)

- Inputs from multiple sources
  - UGC/disparate input points
  - Multiple input formats
- Mixed 16:9/4:3 inputs
  - Different output buckets
- Deliver to customers (service bureau)
  - As opposed to internal or website
High Level Buying Process

- Identify required features
- Identify all candidates that meet those requirements
- Assume quality is equivalent
- Choose candidate who delivers best price for throughput
Identify your Required Features

ATEME MULTI-SCREEN TRANSCODING SOLUTION

MANAGEMENT
- Load Balancing
- Content Protection
- Ad Insertion

PROVISIONNING
- Quality Check
- Live & File Ingest
- Storage

TRANSCODING
- Editing
- Format Conversion
- Loudness Control

DELIVERY
- Packaging
- Streaming
- Adaptive Streaming

SUPERVISION
- System Monitoring
- Redundancy
- Quality of Service

PAY-TV, OTT & MOBILE NETWORKS
- Linear TV
- Catch-up TV
- VOD / Push VOD

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The Buying Process – Identify Requirements

- Identify encoder class
- Checklist features
  - Inputs
  - Outputs
  - Metadata support
  - Captioning/Advertising insertion
  - Digital Rights Management
  - Loudness control
  - Quality control

- API requirements
  - Connectivity to MAM/DAM
  - Connectivity to CMS
  - Hooks to delivery infrastructure
    - Rovi/DivX template support
Inputs and Outputs
**Inputs**

- Vary by product
- Harmonic ProMedia Xpress
  - Targets cable markets starting with MPEG-2 transport streams
  - No MOV/XMF/DNxHD
  - Carbon Coder is the Swiss Army knife alternative
- Don’t assume:
  - List required input formats – A/V/Metadata
  - Verify

**TRANSPORT STREAM INPUTS**

<table>
<thead>
<tr>
<th>Container</th>
<th>MPEG-2 Transport Stream</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MPEG-2</td>
</tr>
<tr>
<td></td>
<td>H.264, including CableLabs &amp; AVC1</td>
</tr>
<tr>
<td>Audio</td>
<td>Dolby Digital (AC-3)</td>
</tr>
<tr>
<td></td>
<td>Dolby Digital Plus (E-AC-3)</td>
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<tr>
<td></td>
<td>MPEG-1 Layer II</td>
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<tr>
<td></td>
<td>AAC-LC</td>
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<tr>
<td></td>
<td>HE-AAC v1 &amp; v2</td>
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<tr>
<td></td>
<td>SMPTE 302M</td>
</tr>
<tr>
<td>Metadata</td>
<td>Closed Captions: A/53</td>
</tr>
<tr>
<td></td>
<td>Teletext PID</td>
</tr>
<tr>
<td></td>
<td>DVB Subtitling PID</td>
</tr>
<tr>
<td></td>
<td>Splicing signaling: SCTE-35</td>
</tr>
</tbody>
</table>

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Outputs

- ID all required single file and ABR formats
  - Very significant differentiation here
- ID plans for:
  - DASH
  - H.264/HEVC
  - WebM/VP9
  - Some will be field upgradeable/silicon based systems won’t be
Metadata Support

- If delivering to multiple distribution/syndication outlets, automated metadata support is key.

- Telestream Agility/ A valon
  - “Distribute simultaneously to YouTube, iTunes, and cable operators. Avalon transcodes multiple media and metadata formats from a single source file and automates delivery to multiple outlets in each target output format.

Note that Agility has been end of lifed by Telestream in 2013.

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Closed Captions/Advertising Insertion

- Broadcast standards
  - EIA 608/708
  - SCTE-20
  - SCTE-27
  - DVB Teletext
  - DVB Subtitles
  - Captions/Teletext/subtitle burn in

- Streaming Standards
  - WebVTT
  - SAMI
  - SRT
  - TTML
  - DVXP
  - SCC

- Advertising Insertion
  - SCTE 35 passthrough
Closed Captions/Advertising Insertion

- Huge differentiator here
  - Companies traditionally serving the broadcast industry have a big head start
  - If you need closed captioning, check these capabilities early
    - Fortunately, most companies with have them make it clear on their brochures
Digital Rights Management

- Streaming
  - AES Encryption – HLS
  - Flash Access – Flash RTMP/HDS
  - Playready – HLS/Smooth

- Device
  - DivX
  - Widevine
Calm Act (or Euro Alternative)

What the New FCC Rules Do

The FCC's new rules require TV stations, cable operators, satellite TV operators and other pay TV providers to limit a commercial's average volume to that of the programming that it accompanies. A commercial may have louder and quieter moments, but, overall, it should be no louder than the surrounding programming. This may mean, however, that some commercials will comply with the new rules, but still sound "too loud" to some viewers.
Quality Control – Where Applied and Functions Performed

- **Pre-encode**
  - Media compliance check (is it in the expected format?)
  - Media quality check (black frames/no audio)

- **Post encode**
  - Error checking (dropped frames, no audio)
  - Quality checking (quantization/SSIM/PSNR)

- **Error handling**
  - Kick out with notification
  - Self-healing – reencode at higher data rate
API Requirements

Agility EOLd

- Identify connectivity requirements
  - Digital/Media Asset Management
  - Content Management System (web publishing)
  - Enterprise control system
- Make sure API is sufficiently robust to support all required connections
Hooks to Delivery Infrastructure

- If working in defined distribution infrastructure like DivX, encoding tool must support
  - Encoding presets for various certification levels
  - DRM injection
- May be similar requirements for Widevine
Differentiating Between Contenders

- Quality
- Performance
- Operational Issues/Cost
  - How many units do you need?
  - What about failover redundancy?
Analyzing H.264 Quality

Elemental

Squeeze Server x.264

Promedia Carbon

Episode Engine - x264
Analyzing H.264 Quality
Vantage vs Elemental Server

- Very minor differences in quality
  - Could be attributed to data rate consistency
Analyzing Performance

- Episode Engine/ProMedia Carbon on HP Z800 workstation
- All other times on dedicated encoders sold by vendor
Very Significant Performance Difference

- Must be built into pricing models
  - Identify required throughput
  - Compute how many encoders are necessary to meet this requirement

- Software encoders
  - Must build in cost of computers to run the encoder
So:

- ProMedia Xpress - $26,000 (ProMedia 5200 Application Server)
- ProMedia Carbon - $4,995
So:

- **ProMedia Xpress** - $26,000 (ProMedia 5200 Application Server)
- **ProMedia Carbon** - $4,995
Operating Models

- Cluster encoders
  - Can add additional encoders by buying new encoders
  - Squeeze Server, Elemental Server, Episode Engine, Vantage
  - No single point of failure
Operating Models

- Controller/Encoding node – Digital Rapids, Carbon
  - Server component adds to price
  - Can be single point of failure
When Comparing Pricing

- Remember to:
  - Add costs of computer when comparing software vs. hardware
  - Understand whether system requires a separate controller or is more of a clustering of encoders
  - Understand the redundancy that you’re looking for and make sure that’s priced in
    - No single point of failure can cost a lot