CONTENT PACKAGING FOR DIGITAL CINEMA

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Content
Packaging / Interchange
For Digital Cinema

• Question: With GXF, MXF, AAF, and [your name here] available, why does digital cinema need a new packaging / interchange scheme?

• Answer: No one said it does. The plan is to understand what we need, and adapt what we can.
The Tools Mastering Works With Today

- Mastering works with Scenes.
  - Scenes can be as short as 1 Frame.

- Scenes are organized into Reels.
  - Reels are fixed length.
In The Projection Booth

- Reels are spliced onto Platters.
  - The entire show is on the Platter, including Trailers.
- It is not uncommon for Reels to be replaced just prior to opening.
  - This flexibility needs to be preserved.
But Digital Isn’t Film

• For Film, Picture and Sound are (usually) on the same Medium.
• For Digital, Picture and Sound can be stored in different files.
  - Interleaved Picture and Sound are also possible, but separate files are generally preferred for Flexibility.
And There’s More To Digital

- Digital Content can have things that Film can’t, such as:
  - Metadata
  - Closed Captioning
  - Queues
  - Do-dahs to trigger lasers, shake your chair, whatever turns you on...
Don’t Forget Security!

• Encryption: Desirable to NOT encrypt the entire file.
  - Got to leave something exposed for the machines to read.

• Digitally Signed Files and Hashes: Tools to identify if digital content is intact and not tampered with.
Putting It All Together

- Digital Cinema Package Requirements
  - Can be organized into chunks similar to Reels. (for Mastering and Flexibility)
  - Supports non-interleaved files.
  - Supports Metadata and other forms of essence such as Closed Captioning.
  - Supports selective Encryption.
  - Supports Security Tools such as Hashes and Digital Signature.
New Terminology
(Just to prove that we know what we’re doing)

• Composition
  - The collection of files that makes up a Movie, Trailer, Ad, whatever.

• Composition List
  - An “index” of the files that make up the Composition. (Can also support Security features, etc.)
What’s A Segment?

- Segment = “digital” Reel
  - A set of Essence, Data Essence, and Metadata files that together comprise a specific period of time in the Composition.
  - Segments are conceptual. They are not a logical element within the Package.
Composition List & Flexibility

• The Composition List contains the hashes for each Composition file, so integrity can be checked.

• A Composition can be updated in the field, piecemeal fashion, by sending the revised Composition files with a new Composition List.
Compositions Can Be Efficient

- A Composition can share files with other Compositions.
  - Can be useful for multiple languages or multiple versions.
  - Each new version (language or different cut) has its own Composition List.
Composition Efficiency

COMPOSITION LIST (feature - english)

COMPOSITION LIST (feature - french)

IMAGE ESSENCE Reel 1 (english / french, 2.39)

AUDIO ESSENCE Reel 1 (english, 5.1)

SUBTITLE ESSENCE Reel 1 (french)

AUDIO ESSENCE Reel 2 (french, 5.1)

SUBTITLE ESSENCE Reel 2 (english)
There's More To The Packaging Story

• We need to Distribute the Composition, or possibly a Partial Composition.
  - Requires a PACKING LIST

• We also need to play multiple Compositions in the Theatre
  - Requires SHOW Assembly

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The Business-Side Has Some Requirements, Too

• Distributors want to Identify the Trailers to be played with a Movie, along with their Play Order.
  - This information is placed in an Event List.
  (We like to avoid Play List as it has different meanings to different folks.)
A Show With Event Lists

SHOW

EVENT LIST

STORAGE

COMPOSITION LIST (trailer)

POINTERS

COMPOSITION LIST (trailer)

IMAGE ESSENCE (english, 1.85)

AUDIO ESSENCE (english, stereo)

COMPOSITION LIST #1 (feature - english)

IMAGE ESSENCE Reel 1 (english, 2.39)

IMAGE ESSENCE Reel 2 (english, 2.39)

SUBTITLE ESSENCE Reel 1 (french)

COMPOSITION LIST #2 (feature - french)

IMAGE ESSENCE Reel 1 (french, 2.39)

IMAGE ESSENCE Reel 2 (french, 2.39)

SUBTITLE ESSENCE Reel 2 (french)

AUDIO ESSENCE Reel 1 (french, 5.1)

AUDIO ESSENCE Reel 2 (french, 5.1)
So How Do We Do All Of This?

- TBD
  - Want to incorporate existing standards wherever possible.

- Technical issues to be addressed:
  - Essence synchronization.
  - Decryption key synchronization.
  - We didn’t talk about Key Epoch!
Summary

• Digital Cinema needs a Packaging / Interchange Scheme that supports the needs of Mastering, Distribution, and Exhibition.

• Don’t do this at home.
Thanks for listening!

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