THE NEXT GENERATION OF MAM

By **Emilio L. Zapata**, CEO, Tedial

Broadcasters are at an advanced stage in the transition to a file-based workflow operation, with different levels of automation and efficiency. Most workflows are designed to simplify archiving, replacing video tapes with content files (an asset one file), and sending to broadcast. In this context, when broadcasters purchase content, they receive an air master copy (one file) that they can send directly to the linear playout system with minor changes.

But everything is moving quickly both in terms of content business and technology. Multi-platform content delivery, IP video networks and UHD production and delivery are identified as the three media technology strategic priorities for media companies. In the production sector UHD has also become an established format as major OTT players now demand content only in UHD. IP video networks are going to replace the classic SDI router very quickly.

This new reality requires new formats and more advanced workflows that provide the necessary flexibility to produce, archive and distribute content efficiently. Efficiency and flexibility are achieved by changing the operation from file-based workflows to component-based workflows and using component based formats (i.e. MXF OP-Atom) for content instead of interleaved formats (i.e. MXF OP-1a). Componentised content has video tracks in video files, audio tracks in audio files and subtitles tracks in subtitle files.

BUILDING A SOLID FOUNDATION

The IMF standard (Interoperable Master Format) defines the foundations for a content delivery business-oriented workflow that allows multiple versions of material (SMPTE ST 2067). The IMF provides the ability to create many versions without duplicating the common essence used for each. Instead, one Composition Play List (CPL) is required for each version of the material, which is much smaller in size compared to the track files themselves. Essence that is specific to the desired version is created and supplied along with a new CPL, which in conjunction with the common essence results in the desired version. The IMF standard (SMPTE ST 2067) facilitates the distribution of unique content versions between owners, service providers and distributors. Each of these versions can be transformed into multiple deliverables, tailored for different target platforms and audiences.

UHD formats pose extraordinary challenges. With medium/low compression levels, the size and the number of video files grows extraordinarily. The technology of most UHD cameras segment during recording in consecutive video files of 2-4 GB and/or save each frame in a different file (DPX, RAW). Furthermore, 3D video with two video tracks stresses the entire platform. Content in UHD formats need a component-based solution where the different video, audio and subtitle tracks are in multiple files.

ST 2110 is an IP video standard for sending digital video over an IP network. Video is transmitted in an uncompressed format, and audio, video and ancillary data are carried as separate streams. ST 2110 is a component-based IP video streaming standard mainly used for live content production and distribution.

In the next few years the production, post production and distribution of UHD content will be based on components with the video, audio, subtitles and metadata being in separate files and streams. In this scenario, the archiving of the assets and the processing workflows have to be extraordinarily efficient.

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MAM technology has been essential in accelerating the transition from the domain of videotapes to the domain of content files. Files that use interleaved wrappers, such as MXF OP-1a. The MAM has allowed the indexing of the timeline, maintaining the time code, creating a proxy and the partial recovery of segments of content (EDLs). In fact, for broadcasters the substitution of videotapes for files has not meant any substantial change in workflows, significantly improving the efficiency and reliability of the operation.

The current reality is that most broadcasters have large archives containing multiple legacy codec assets that were made and stored using multiple legacy production workflows. These archives of assets are based on interleaved formats, where the content of the asset is a single file that includes the video, audio and subtitle tracks.

It's clear that splitting content into individual components improves automation, reduces costs and increases the volume of media you can process. It would therefore seem natural for broadcasters to prepare for a completely component-based content chain instead of continually duplicating content as flattened files. The challenge for the MAM industry is to provide broadcasters with a new generation of MAMs that ensures a smooth transition from the file-based workflows and interleaved formats model to the component-based workflows and formats model.

How do we ensure that the transition is smooth and non-disruptive? The answer is a MAM that unifies both models, raising the level of abstraction of the asset that allows users to present the interleaved and component-based content in a unified way and keep their content in the current format. Tedial proposes a high-level object called Mediafile that describes each of the video, audio and subtitle tracks, as well as the temporarily ordered set of files that each track has. If the media is in interleaved format, all the tracks in the Mediafile will point to the same file, but each will record the internal track/channel of the file they represent.

The advantages are obvious. Broadcasters do not need to migrate their archive from file-based to component-based assets and can receive content in both formats. Although the file-based workflows will continue to be valid for the interleaved content, it will be necessary to develop the corresponding component-based workflows.

We have highlighted the advantages and justified the need for the component-based archive for both content exchange (IMF format) and efficient management of UHD content. Now the MAM must solve three very important functionalities efficiently and transparently to the user:

- Proxy streaming must be component-based (DASH, HLS, CMAF)
- The partial restore of content segments (popular EDLs) must be available for both formats (interleaved and components)
- Versions created from component-based content never duplicate content in the archive. Access to the versions of a master must be simple and intuitive

The rapid evolution of content business has made broadcasters require media tools that provide continuous access to content throughout their business. Removing the unnecessary, and at times overwhelming complexity caused by multiple workflow states, wrappers and codecs, etc., enables easier discovery of related media. By providing improved tools, this complexity is replaced by a logical view of the content and workflow with direct access to the different components for validation. ■