Application note
IMF Mastering

Case summary

Need: Easy exchange of multiple versions of content as one package in a digital format

Solution: The Interoperable Master Format (IMF) and R&S®CLIPSTER
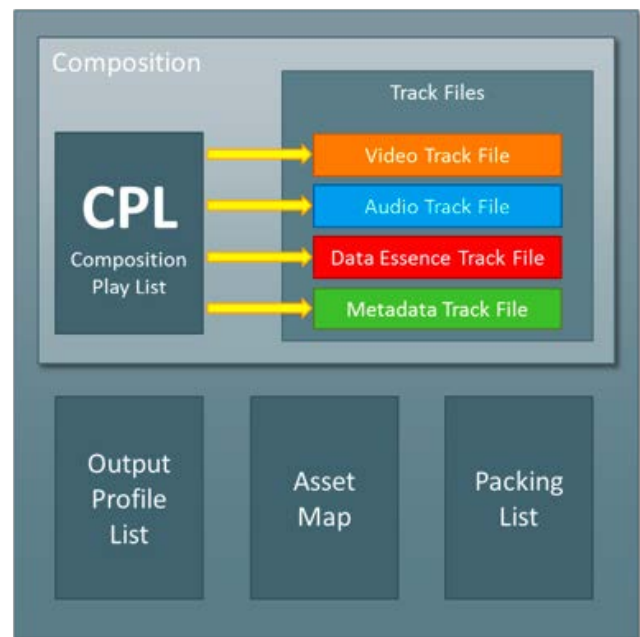

Background

The current situation in the film industry with its tremendous amount of file formats, codecs and containers which exists to handle digital video data, is a real challenge when it comes to exchanging content. This scenario is caused due to the lack of a general standard for the exchange of digital video data, corresponding to the HDCAM-SR standard. Furthermore, there is no proper solution available for an easy distribution and transfer of a multitude of master versions, including different languages, subtitles and video inserts between business partners. To fill this gap the Interoperable Master Format (IMF) was created by the SMPTE (Society of Motion Picture and Television Engineer) members including Rohde & Schwarz DVS and 186 well-known leading U.S. studios, manufacturers and vendors.
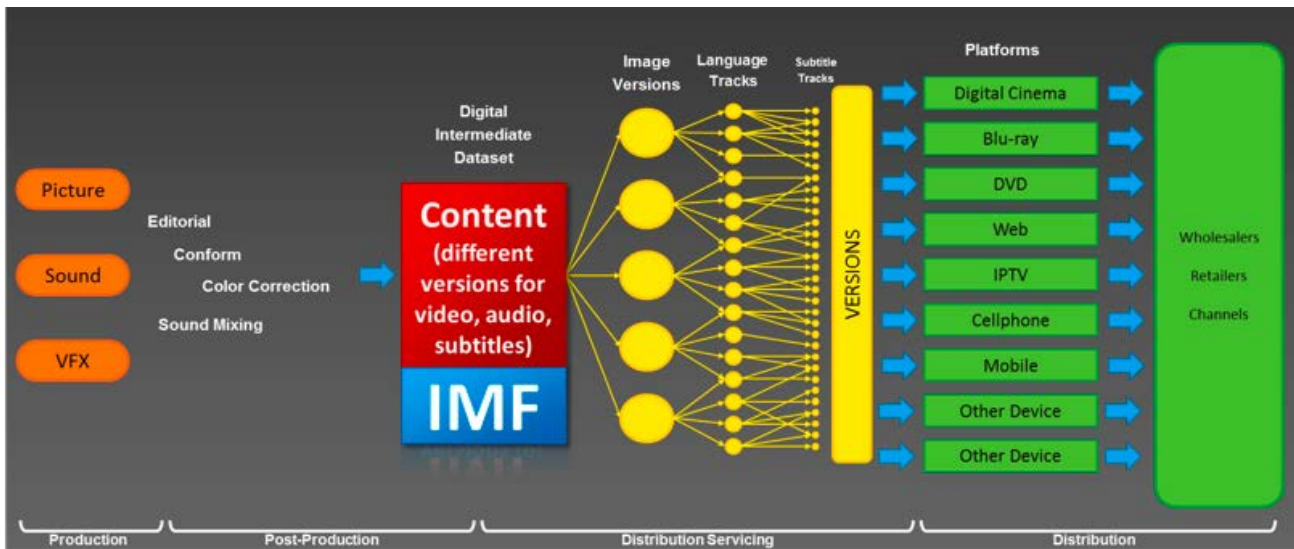
Introducing IMF

The IMF is a SMPTE standard (SMPTE ST2067 group) based on the Digital Cinema standards. It is the upcoming solution to clarify the confusion caused by the multitude of versions and it will become the file-based successor for the tape-based solution. The key feature of IMF is its highly flexible versioning capabilities. The versioning allows minimizing the storage amount by saving the disparities instead of creating additional flattened versions. In addition, mezzanine level compression allows further size reduction. IMF is the contribution format aimed at business-to-business usage, such as content owners, distributors, post production facilities and broadcasters.

Content owners can distribute or deliver produced content by using the versioning capabilities to create multiple versions as one IMF package (IMP) with ease. Distributors, on the other hand, are able to create multiple end-formats from such an IMP, like Netflix,

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Blu-ray, DVD or mobile, just to name a few. Broadcasters receiving IMPs with program content, commercials or episodes can easily convert the content to their in-house format.

The structure of an IMP is similar to the setup of a Digital Cinema Package (DCP). The IMP contains an Output Profile List (OPL), one (or multiple) Composition Play List (CPL), an Asset Map and a Packing List.

The track files are wrapped into an AS-02 subset. The OPL provides a table of contents and transcoding instructions like data rate, resolution, codec, and bit rate. The CPL is comparable to an Edit Decision List (EDL) or a CutList which includes the information to assemble the playback for the given content and refers to various track files. The Asset Map is a list of all files included in the IMP. The Packing List specifies the hash value of all files in the composition and is used to verify if data have been corrupted or tampered with in some way. Among the core framework of IMF which is responsible for playlists, major constraints like AS-02 wrapping, audio routing, subtitle parameters, etc., a modular application layer system is available. These layers are aimed at creating plug-in like applications which fulfil requirements like a higher compressed codec, specific resolutions or frame rates.

Speeding up workflows with CLIPSTER

When it comes to versioning your master, IMF will help improve your workflow. With Rohde&Schwarz DVS's CLIPSTER the acquired speed reaches another level: the mastering station fully supports the standard (incl. application layer #2 extensions) – already supporting IMF at 4K.

Since IMF stores differences between versions but it does not create flattened versions, a minimum of data have to be handled. A common master consists of one main title, main video, main credits and its main audio. A typical version would contain new audio and several video inserts. Due to versioning, different lengths, in case of censorship versions, director's cut, commercial black insertions/removals, airline edits or modifications are all easily attainable.

CLIPSTER enables IMF versioning and inventory management of content for use in multi-version, multi-lingual, and multi-delivery media environments. Utilize CLIPSTER to create the required IMF with the respective tracks for file-based workflows and file-based libraries. Ideally, CLIPSTER is used for B2B exchange and is now available in resolutions of up to 4K instead of the originally planned HD.

CLIPSTER allows a smooth transition from tape-based workflows to digital file-based workflows. Using SOAP (Simple Object Access Protocol), automate CLIPSTER to create your IMF mezzanine files as output deliverables.

The highly customized and intuitive Rohde&Schwarz DVS wizards and tools guide you through every step of the mezzanine workflows, simplifying the respective processes.

For high frame rates and 4K applications, CLIPSTER offers faster than realtime encoding of JPEGE2000 RGB/YUV file sequences up to 500 Mbit/s and beyond, depending on the JPEG2000 profile.

Several integrated optimizing tools allow for unique actions: the master and the varying IMP versions can be merged, resulting in one single IMP with multiple CPLs. With that, the integrated Merge Tool offers users the advantage to merge, send and archive the individual IMPs that are created through versioning as one complex deliverable.

CLIPSTER offers you diverse options for the IMF: version it, merge it, thin it out or transform it into other formats. On top of that, high-speed generation of compressed formats for delivery and archival are available.

Running the IMF workflow on CLIPSTER will be giving you a choice. You can flexibly decide to choose either AS-02, AS-11 or IMF – or even switch between them. Whatever your workflow requires at any given time you can settle for any option: ingest and outgest either IMF, AS-02, AS-11 or DCP.

Benefits

◗ "Any File, Any Style" allows for flexibility: the mastering formats are interpreted as project files

◗ Ease of use thanks to IMF wizard and efficient toolset

◗ SOAP interface provides automated control from third-party applications

◗ Sizing control for distribution into various aspect ratios

◗ Freely choose between formats like IMF, AS-O2, AS-11 or DCP as ingest and outgest material

◗ IMP Merge Tool: merge, send and archive the individual IMPs

About Rohde & Schwarz DVS

For more than 25 years, Rohde & Schwarz DVS GmbH has been very successful in the professional film, video post production and broadcast markets. The specially developed and manufactured hardware and software are applied to the production of popular TV series, Hollywood blockbusters and in Digital Cinema. R&S®CLIPSTER was the first system in the world to make real-time 4K processing possible. The future-proof ingest and production server R&S®VENICE offers a flexible solution for modern, file-based workflows in broadcast environments.

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