

Quick introduction to MXF AS02 and MXF AS03

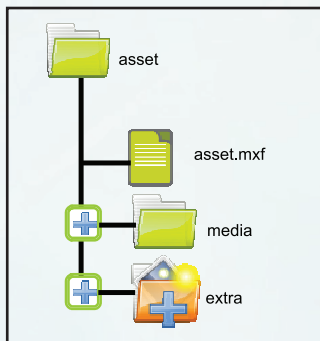
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MXF AS02 is a mastering tool. AS02 constrains the MXF toolkit to efficiently carrying essence (pictures, sound and metadata) through the processes needed to create deliverables and versioning. As a media asset passes through a company (or companies) it can carry the essence and metadata with minimum data overheads.

MXF AS03 is a delivery format. AS03 constrains the MXF toolkit to efficiently carry final deliverables in a compact, robust and viewable format.

MXF AS02

MXF AS02 uses only elements of the 2004 version of the MXF standard, designed for efficiency of operation.



The top level structure of AS02

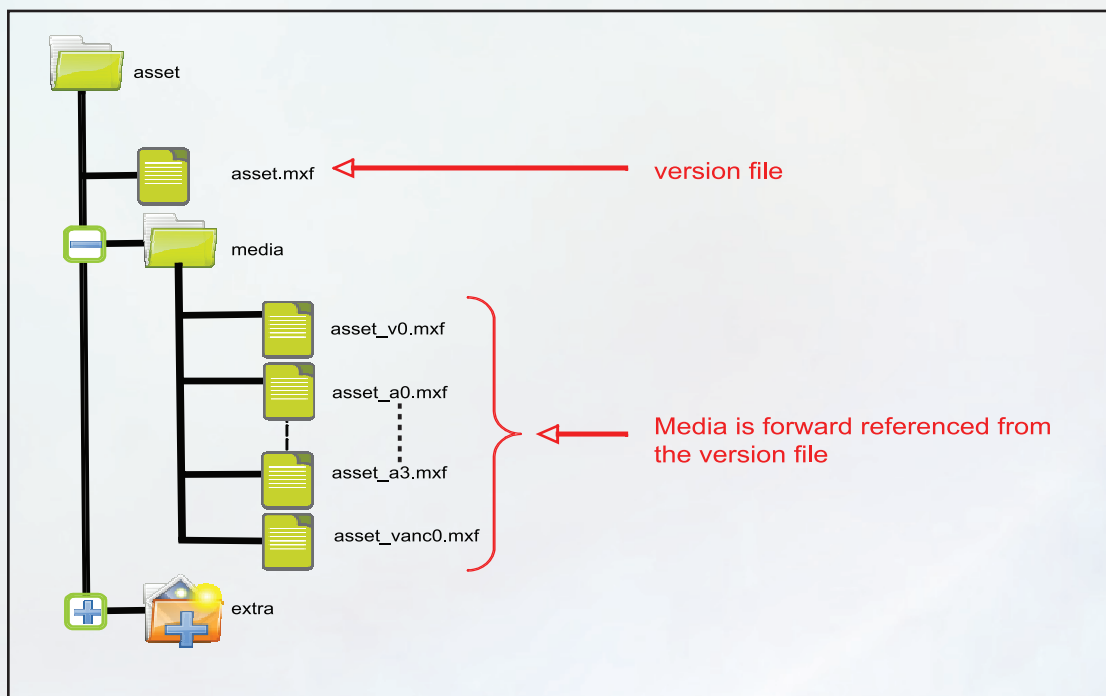
To enhance interoperability, specific constraints are made on application behavior, file layout and permitted codec range. Whilst most of these constraints are in the controlling document (<http://wiki.amwa.tv>), some of the constraints need to be set at the facility level.

It was realized by the MXF designers that each facility has specific needs, for example DNx in one facility and JPEG2000 in another. Full interoperability using a vendor's standard product requires that these special needs are constrained and documented. These facility specific restrictions are defined by the business and are written into a managed and version controlled document called a 'shim'.

The dictionary definition of shim is "a small piece of wood or metal to adjust the gap between machine parts."

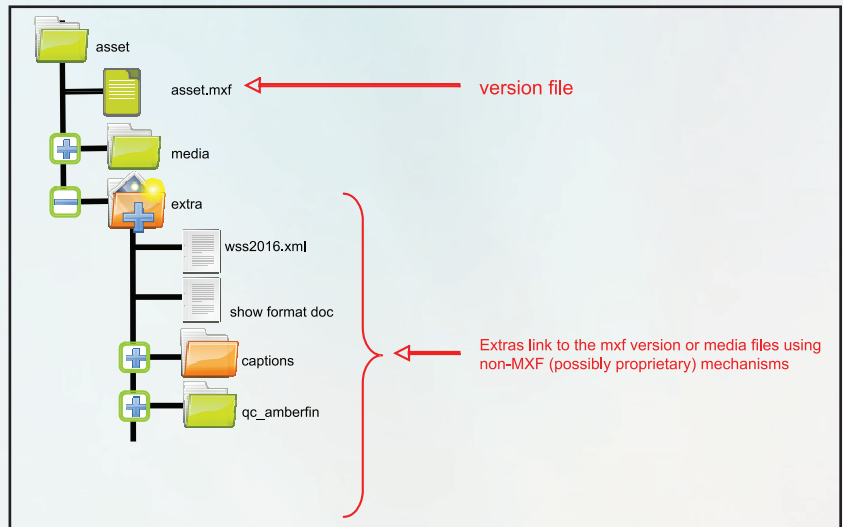
In this instance, a shim is a small piece of specification designed to fill the gap between the generalised committee specification and the localised use of that specification within a facility.

The figure below shows the basic layout of files in an AS02 structure:



The operational rules of AS02 are as follows

- All components of the asset lie inside a root folder.
- Multiple versions of the asset may exist.
- The primary version (if it exists) has the name of the root folder.
- Essence components holding video, audio, data and are in a subfolder called media.
- Version files are MXF files with no essence and are very small (10kB - 500kB).
- Component files are mono-essence (video in a video file, audio in an audio file).
- Non-essence files are stored in a subfolder called extra.



MXF AS03

While MXF AS02 is intended for the 'work in progress' mastering of content, MXF AS03 is intended for delivery of finished content and also uses only elements of the 2004 version of the MXF standard, designed for efficiency. It's important that AS03 files can be reliably played back by different applications and users in a consistent way.



Unlike AS02, AS03 files are self contained.

AS-03 files contain defined metadata sets for content identification and verification vs. delivered traffic metadata. There is also provision for additional metadata sets that may be provided for use in program libraries.

Unlike AS02, an AS03 asset is always a single file. It has been designed to use the simplest and most interoperable features of MXF-2004. Some examples of how an AS03 file constrains MXF is as follows:

- AS03 files contain a single programme comprised of Video, Audio services, Closed Captioning and other ancillary data.
- Essence in each Generic Container is frame-wrapped and interleaved frame-by-frame.
- Essence is divided into partitions, not longer than 30 minutes of programme time, and new partitions may be started to meet this requirement
- AS03 files include full MXF Index Tables.
- Video is MPEG-2 MP or 422P, or H.264, any GOP structure, at bit rates of 5 up to 50 Mbps, in compliance with ISO 13818-2 Elementary Streams.
- Audio is PCM pairs, AC-3 or Dolby E.
- Closed captioning if present, is carried in a SMPTE 334-1 and 2-2007-compliant ANC packet within a SMPTE 436M-2006-compliant VBI/ANC GC Element, using 8 bit encoding.

Full details of AS03 constraints are available from AMWA.

Unlike AS02, all custom metadata lives inside the file. The basic AS03 metadata specification includes:

- Identifier, e.g. "ISAN 0000-0001-8947-0000-8-0000-0000-D"
- Shim name e.g. "PBS NGIS HD"
- Signal Standard e.g. "486/720/59.94i/4:3"

To maximize commonality across applications, AS03 specification is divided into general provisions that apply to all applications and specific constraint sets (called "shims" for similar reasons to AS02) that apply to defined applications. Each shim provides a set of constraints that reduce the range of variability that may be needed in well-defined categories of applications. These categories may address particular type of programming or programming genres, or they may address requirements of particular organisations.

The AS03 shim is intended to tailor the general specification for use in a user specific application. The specification makes the shim parameters clear. The shim allows vendors and users to clearly define the stable operating parameters of an MXF device within the facility.

Constrained AS03 properties include:

- Program Bitrate
- Picture Format
- Compression format
- Color Sampling format
- Sound coding
- Language lists (mandatory and optional)
- Sound track arrangements
- Shim specific metadata e.g. V-chip rating for USA

Please contact AMWA for more information.

