MIPoPS DELIVERABLES: FILE FORMATS

This chapter contains the text from two of our hand-outs on file formatting, specifically for preservation files. It includes an overview of the file formatting options available at MIPoPS and an explanation of our recommendation.

Overview—the benefits and characteristics of the MIPoPS preferred preservation file format.

Wrapper: .mkv (Matroska) file
Bit Depth: 10 bit
Video Codec: FFV1 version 3
Operating Systems: Mac and Windows
Compatible Players: VLC (Video LAN Client)*, DivX Video, Media Player Classic (MPC), MplayerX
Advantages:

- smaller file than uncompressed video
- high-quality (mathematically lossless compression)
- recognized preservation format

MIPoPS Preferred Preservation File Format Explained

The preservation master file is the digital file that is saved for long-term preservation; thus, it must be a high-quality representation of the video and audio signals from the original analog video recording. The digital preservation master file should reproduce the most accurate version of the original analog video possible. Archives and institutions adhere to a variety of file formatting combinations based upon their archiving needs and standards prescribed by several trusted authorities. MIPoPS has chosen their format based upon thorough research of these standards and recommendations made by experts in the field, including Sarah Shipley (Digital Assets Manager, Seattle Municipal Archives) and Dave Rice (Archivist/Digital Systems Manager, The City University of New York Television)[1].

Here is a breakdown of the preservation file format employed by MIPoPS:

.mkv (wrapper)—this is a container for the video and audio information. It is not related to the quality of information it contains. It is just to communicate with the player used by your institution's operating system. Matroska files (.mkv) are consistently compatible with both operating systems and have the highest quality. In contrast:

- Audio Video Interleave (.avi) files are prone to corruption and its smaller file size sacrifices quality
- Quicktime (.mov) files are huge (taking up a lot of server space) and are incompatible with Windows operation system

10 bits (bit depth)—the resolution quality of the video picture. 10 bit is considered standard for a preservation copy and allows for the highest quality possible to be saved.

FFV1 version 3 (video codec)—every time a video file is moved (to/from a hard drive, downloaded, etc.) it runs the risk of losing information, reducing the quality and integrity of the audio/video content. During the compression process, some of the video information is removed, which can reduce the quality of or corrupt the video when decompressed. Uncompressed is considered the archival ideal for a preservation copy. However, uncompressed files are very large and take up a lot of space, which many institutions and archives that can't afford to store. Lossless compression is the only other solution to keep the maximum quality from the original source. This codec takes up less space (about 30%) and rarely

[1] For more information on understanding file formats, please see the Additional Online Resources section at the end of this manual.

produces compression artifacts. FFV1 version 3 (a lossless video codec) was developed with the input of archivists in order to address the specific requirements of the heritage sector.

As described in the Library of Congress specifications, FFV1 version 3 is "a lossless intraframe codec." The most recent release, version 3, "was developed with the input of 25 archivists in order to address the specific requirements of the heritage sector." Matroska 26 files containing video essence encoded as FFV1 has been adopted as a preservation 27 format by many institutions, notably The City of Vancouver Archives, Archivematica and Austrian Mediathek . Every time a video file is accessed (to/from a hard drive, downloaded, 28 etc.) it runs the risk of losing information, reducing the quality and integrity of the audio/video content. During the compression process, some of the video information is removed, which can reduce the quality of or corrupt the video when decompressed. Uncompressed is considered the archival ideal for a preservation copy. However, uncompressed files are very large and take up a lot of space, which many institutions and archives that can't afford to store. By using lossless compression with the well documented open source codec FFV1, we maintain original quality while allowing more capacity for digital storage. In addition, the size of lossless compression files enables institutions to address the need for redundancy storage and adhere to the standard of retaining three copies of all preservation files. Considering the limited storage space of heritage institutions, it is advantageous to retain three copies of a lossless compression file rather than only one copy of an uncompressed file.

Access File

- Use: small reference file for streaming and digital playback
- Type: H.264, MPEG4, AVC (for more information on specifications for the MIPoPS access files, please see the "Trimming and Creating Access Files in Handbrake" chapter.

Choosing the Right Preservation File Format for Your Institution

The preservation master file is the digital file that is saved for long-term preservation; thus, it must be a high-quality representation of the video and audio signals from the original analog video recording. The digital preservation master file should reproduce the most accurate version of the original analog video possible. Preservation master files are quite large; for example, YUV uncompressed 10 bit preservation master files produced from standard definition video are approximately 100 gigabytes (GB) per hour.

Wrappers – this is a container for the video and audio information. It is not related to the quality of information it contains. It is just to communicate with the player used by your institution's operating system. Please check your preferred option below.

☐ **.avi** (Audio Video Interleave)
Operating System: Windows
Compatible Players: Windows Media Player, RealPlayer, Adobe Premiere Pro, Adobe Premiere Elements, VLC (Video LAN Client)

☐ **.mov** (QuickTime)
Operating System: Mac
Compatible Players: QuickTime Player, iTunes, VLC (Video LAN Client), MPEG Streamclip, Adobe Flash

☐ **.mkv** (Matroska)
Operating Systems: Mac and Windows
Compatible Players: VLC (Video LAN Client), DivX Video, Media Player Classic (MPC), MplayerX

☐ **.mxf** (Material Exchange Format)
Operating Systems: Mac and Windows
Compatible Players: Avid Media Composer, Adobe Premiere Pro (3.1 or above), Sony Vegas, GrassValley EDIUS

Bit Depth—the resolution quality of the video picture. 10 bit is considered standard for a preservation copy. However, if your operating system cannot handle a file of this size, we also can create an 8 bit file. Please check your preferred option below.

- ☐ **8 bits**
- ☐ **10 bits**

Video Codec—in the compression process, some of the video information is removed, which reduces the quality of the video when decompressed. When editing video, it is preferred to work with video that has never been compressed as this maintains the best possible quality, with compression performed after completion of editing. The lossless video has no compression artifacts. Uncompressed is considered standard for a preservation copy. Please check your preferred option below.

- ☐ **Uncompressed**
- ☐ **FFV1 version 3**
- ☐ **ProRes**
- ☐ **JPEG2000**