[UNDER CONSTRUCTION: last update 20200614]

1 Introduction

During writing software to change dates in MP4/MOV files I had a lot of moments that I thought: how is this data stored? There are a lot of special cases that have probably grown during the development and merging with other standards. This document (for now) focuses on the atoms/boxes where metadata is stored. The idea behind this document to make things more clear and explain some of the knotty terminology with things often meaning the same (or not).

About this *webpage design*: there is none. I am currently updating this information in an HTML file that I edit MS Word, with the main aim to also make it printable on A4/letter format. There are Excel tables linked in this document that I want to 'keep on the page'. I realise that it looks sub-optimal in a browser... Please resize the browser to a small width, or: [pdf version here]

MP4 or Quicktime? What name to use: The MP4 format is based on the Quicktime format[1] but from here I will call it MP4 format since this has become more general.

2 Dates and data in MP4 files

This whole exercise started with the annoyance of having MP4 files wrongly dated because of wrong time-setting on the recording device and also by noticing strange sorting behavior during sorting in Google Photos and other applications. Simply, the first distinction is between the operating system file attributes (time created, modified, last opened) and the data stored within the MP4 file.

3 Atoms that contain metadata

3.1 Meta atom

Table 1: Example of metadata atom that has no 'keys' section. (file had no metadata before, metadata inserted by Windows property editor). Note that metadata atom is a **full-atom here**. File:[2]

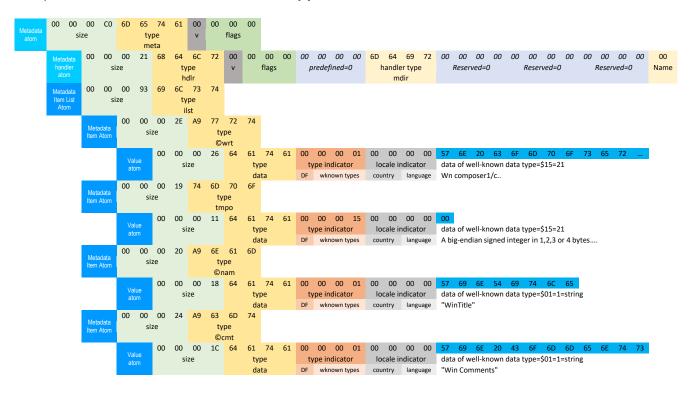
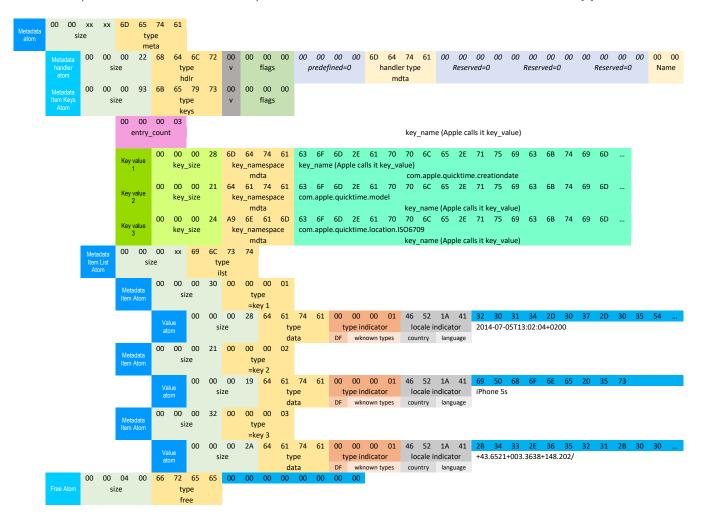


Table 2: Example of metadata atom that has a 'keys' section. Note that metadata atom is a non-full-atom here. File: [3]



3.2 Microsoft Xtra atom

When an MP4 or MOV file is edited by Windows Properties in the 'Details' tab of (right mouse), an 'Xtra' atom is added in the \moov\udta atom.

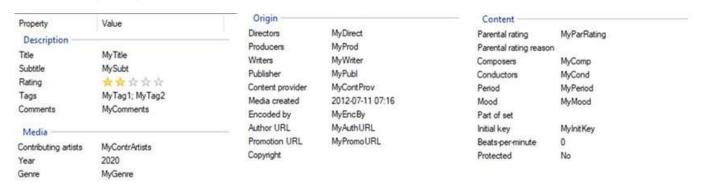


Figure 1: Properties edited by Windows. 'Media created' is read-only.

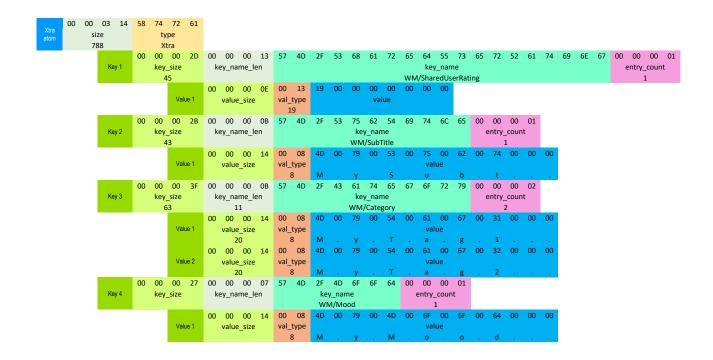
Information is not easy to find. The data can be stored in various types that are indicated by a type enumeration (like well-know types in the meta atom).

I cannot find this information as you would expect it on the Microsoft website. Although many 'keys' that are used in the Xtra atom (e.g. WM/Composer) are described in the WMF Attribute list (1) including a type enumeration (WMT_ATTR_DATATYPE enumeration); part of this enumeration is as follows: WMT_TYPE_DWORD = 0, WMT_TYPE_STRING = 1, WMT_TYPE_BINARY = 2 etc. However, this is not the enumeration used in the Xtra atom.

The actual enumeration used I found in Exiftool source code (2) and in an Xtrabox Java script (3), and is shown in Table 3. As noted in (2), an implementation has existed in a branch of mp4v2 but has been removed. This is discussed in (4).

Table 3: Type enumeration of Xtra values

Const Name	Decimal	Hexadecimal
MP4_XTRA_BT_UNICODE	8	\$8
MP4_XTRA_BT_INT64	19	\$13
MP4_XTRA_BT_FILETIME	21	\$15
MP4_XTRA_BT_GUID	72	\$48



1 https://en.wikipedia.org/wiki/MPEG-4 Part 14#

- 2 MOV_0234-windowscomments.mp4
- 3 Apple-Iphone5s.mov
- 1. **Microsoft.** Windows Media Format 11 Attribute List. [Online] [Cited: 6 14, 2020.] https://docs.microsoft.com/en-us/windows/win32/wmformat/attribute-list.
- 2. **Harvey, Phil.** Perlscript "Microsoft.pm". [Online] [Cited: 6 14, 2020.] https://github.com/exiftool/exiftool/blob/master/lib/Image/ExifTool/Microsoft.pm.
- 3. "XtraBox.java" script. [Online] [Cited: 6 14, 2020.] http://www.java2s.com/example/java-src/pkg/com/googlecode/mp4parser/boxes/microsoft/xtrabox-3706e.html.
- 4. mp4v2 issue #113. [Online] 8 5, 2011. [Cited: 6 14, 2020.] https://code.google.com/archive/p/mp4v2/issues/113.