INTERNATIONAL STANDARD

ISO/IEC 23000-22

Information technology — Multimedia application format (MPEG-A) —

Part 22:
Multi-image application format (MIAF)

AMENDMENT 1: Reference software and conformance for multi-image application format

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Technologies de l'information — Format pour application multimédia (MPEG-A) —

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8418b9e85*Partie 22: Format pour application à images multiples (MIAF)*

AMENDEMENT 1: Logiciel de référence et conformité pour le format pour application à images multiples

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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Clause 5

Add a new paragraph after paragraph 6 as follows:

Annex B provides reference software and conformance.

Annex A

Add a new annex after Annex A as follows:

Annex B
(informative)

Reference software and conformance

B.1   General

The multi-image application format (MIAF) is based on HEIF. HEIF has conformance and reference software. MIAF introduces additional restrictions to HEIF and defines other profiles. Hence the MIAF reference software serves as a validation tool for MIAF products.

There are three conformant types of "products" in the MIAF specification:

— "MIAF files": given a file, it should be possible to indicate if it is valid according to MIAF or not, i.e. if the 'shall' statements are respected.

— "MIAF reader": given a reader, it should be possible to verify if the associated 'shall' statements are respected.

— "MIAF renderer": given a renderer, it should be possible to verify if they are respected.

This annex provides reference software for the first product.

The software includes a parser for MIAF files, a rule checker and test streams which serve as a non-regression test suite for rules. The separation between the validation engine and an external set of rules offers opportunities to leverage this effort for other relating standards.

The reference and conformance software is available at: https://standards.iso.org/iso-iec/23000/-22/ed-1/en/amd/1/.

B.2   Tool description

The tool is named "compliance warden" (abbreviated 'cw').

The tool is a CLI (command-line interface):

```
$ bin/cw.exe
Usage: cw.exe <spec> <list|input.mp4>
```

Example output:

```
[Rule #22] Composition times for trackId=1 different from alpha plane trackId=2
1 error(s).
```

or

```
[Rule #1] The HandlerBox shall be the first contained box within the MetaBox
[Rule #3] MetaBox shall not contain a XMLBox
[Rule #3] MetaBox shall not contain a BinaryXMLBox
[Rule #4] 'hdlr' not found in MetaBox
4 error(s).
```

The tool allows the choice of standard to check conformance against. The tool is extensible to any set of rules, allowing possible extensions to CMAF or any other MPEG standards.

The tool is coded with modern C++ and is portable to any system. The code is unit tested.

Build the code:

— Unix: `make`

— Mac OS X: `CXX=scripts/darwin.sh make`

— Windows: `CXX=my_compiler make`

A test is a set containing a text description of the rule to check, and a lambda function (currently only written in C++) taking as parameters a virtual root box representing the file root level and a way to output data (e.g. to build a report). Example:

```
"Subclause 7.2.1.4:\n"
"The file-level MetaBox shall always be present.\n"
"The MetaBox shall be present at the file-level",
[] (Box const& root, IReport* out)
{
  bool found = false;

  for(auto& box : root.children)
    if(box.fourcc == FOURCC("meta"))
      found = true;

  if(!found)
    out->error("'meta' box not found at file level");
}
},
```

The test suite execution is trivial:

```
$ tests/run bin
* real_mp4_aac
* real_mp4_avc
* real_mp4_heif
* check_rules_folder dummy.mp4
[...]
* check_rules miaf miaf/valid-primary-item hif
* check_rules miaf miaf/valid-tkhd_transformations hif
* check_rules miaf miaf/valid-unknown-box hif
* miaf_file_extension
OK
```

Below is an example of the file used to generate a test stream. The syntax comes from the nasm assembler:

```
%define BE(a) ( ((((a)>>24)&0xFF) << 0) + ((((a)>>16)&0xFF) << 8) +
((((a)>>8)&0xFF) << 16)  + ((((a)>>0)&0xFF) << 24) )

ftyp_start:
dd BE(ftyp_end - ftyp_start)
db "ftyp"

db "isom"
dd BE(0x200)
db "mif1", "miaf", "dumy", "dumy", "miaf"

ftyp_end:
```

The exact list of rules can be obtained by running this command:

```
$ bin/cw.exe miaf list
```