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

Part 6: Professional archival application format

AMENDMENT 1: Conformance and reference software for professional archival application format

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

Partie 6: Format pour application d'archivage professionnel

AMENDEMENT 1: Conformité et logiciel de référence pour format pour application d'archivage professionnel

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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Amendment 1 to ISO/IEC 23000-6:2009 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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

Part 6:
Professional archival application format

AMENDMENT 1: Conformance and reference software for professional archival application format

Replace Clause 10 with the following:

10 Conformance points and conformant files

10.1 Conformance Points

PA-AF defines five conformance points. They are:

— Conformation point 1 provides basic packaging functionality. A PA-AF file that conforms to this conformance point must have minor_version value “paf1” in its ftyp box. The implementation that conforms to this conformance point shall implement:

  — MPEG-21 File Format for PA-AF

  — MPEG-21 DIDL 2nd Edition Profile for PA-AF

  — ISO/IEC 21000-3:2003

  — MPEG-7 Creation Information

— Conformance point 2 provides a capability to describe data protection, data compression, and data integrity checking in addition to the basic packaging functionality. A PA-AF file that conforms to this conformance point must have minor_version value “paf2” in its ftyp box. The implementation that conforms to this conformance point shall implement:

  — All components in conformance point 1

  — MPEG-21 IPMP Components Base Profile for PA-AF

— Conformance point 3 provides a capability to describe governance on the usage of PA-AF file in addition to the basic packaging functionality. A PA-AF file that conforms to this conformance point must have minor_version value “paf3” in its ftyp box. The implementation that conforms to this conformance point shall implement:

  — All components in conformance point 1

  — ISO/IEC 21000-5:2004/Amd.1:2007

— Conformance point 4 provides standard context information for PA-AF file and its Content Information in addition to the basic packaging functionality. A PA-AF file that conforms to this conformance point must have minor_version value “paf4” in its ftyp box. The implementation that conforms to this conformance point shall implement:

  — All components in conformance point 1

  — MPEG-7 MDS Scheme Profile for PA-AF

— Conformance point 5 provides all functionalities offered by conformance points 1 thru 4. A PA-AF file that conforms to this conformance point must have minor_version value “paf5” in its ftyp box. The implementation that conforms to this conformance point shall implement:

  — All components in conformance point 1

  — MPEG-21 IPMP Components Base Profile for PA-AF

  — ISO/IEC 21000-5:2004/Amd.1:2007

  — MPEG-7 MDS Scheme Profile for PA-AF

10.2 Conformant files

Conformant files shall be readable by the professional archival application format file extractor as described in 11.2. The general structure of the file shall conform to the normative file structure defined in 9.2.
Several conformant files have been made using the authoring tool to demonstrate some possible combinations of components defined by the specifications of the professional archival application format. Table AMD1.1 lists those conformant files with their specification conformance points.

Table AMD1.1 — Conformance files

	MPEG-21 File Format	MPEG-21 DIDL 2nd Ed.	MPEG-21 DII	MPEG-7 CI	MPEG-21 IPMP BP	MPEG-21 REL	MPEG-7 MDS
File 1	○	○	○	○			
File 2	○	○	○	○	●		
File 3	○	○	○	○		□	
File 4	○	○	○	○			■
File 5	○	○	○	○	●	□	■

○ Conformant point 1

● Conformant point 2

□ Conformant point 3

■ Conformant point 4

All Conformant point 5

Add the following new clause:

11 Reference Software

11.1 Authoring tool

11.1.1 Architecture

The PA AF packager/authoring tool provides a sample software implementation for archiving PA-AF contents into the MPEG-21 file format. The packager/authoring tool contains the following features:

1. File manager and content manager to locate, list, and register the files to be archived
2. Metadata authoring modules for MPEG-21 and MPEG-7 metadata
3. File packager to package the contents and metadata into the archive
4. Additional managing modules/library for content-specific pre-processing tools, dissemination tools, media player, etc.

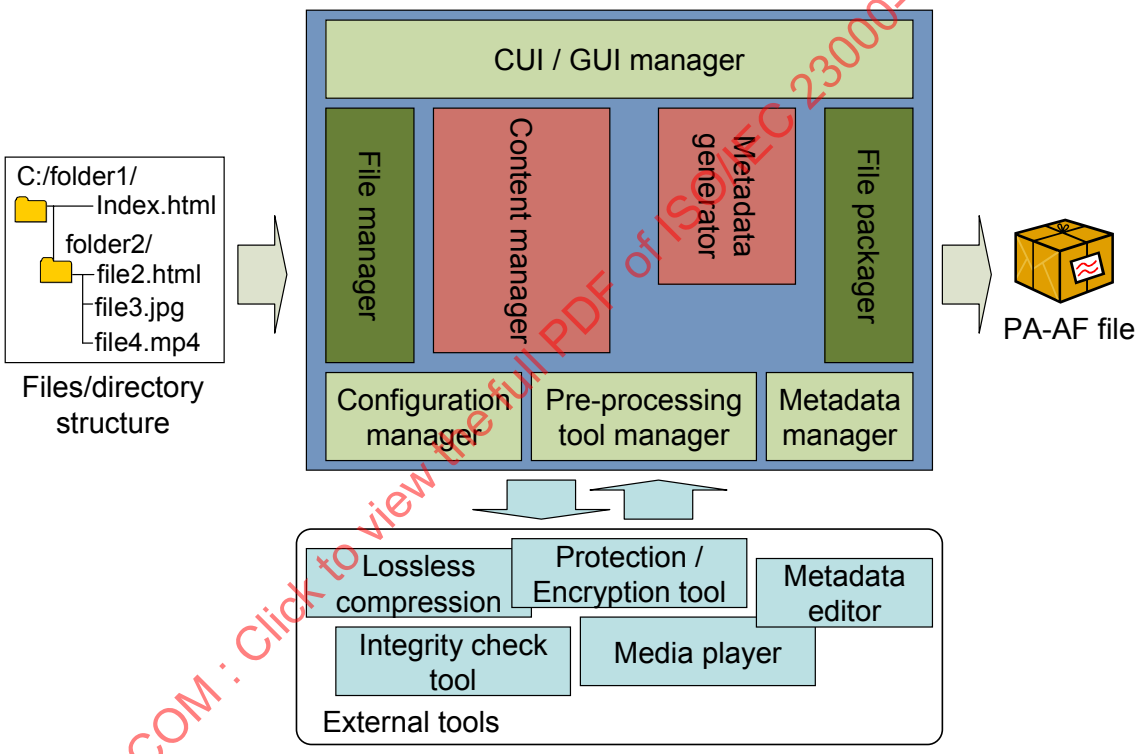

Figure AMD1.1 — A PA-AF packager/authoring tool architecture

The packager/authoring tool system architecture contains several modules as shown in Figure AMD1.1. The inputs of the packager/authoring tool are the files and the directory structure. The file manager first lists and registers the files to be packaged to the file format. It shall maintain information regarding the relative location of each file related to the directory structure, which will be stored in the meta box along with MPEG-21 metadata. The content manager reads the file contents and obtains file information, such as file size and file type, and prepares the files to be packaged. A metadata generator generates metadata related to PA-AF (e.g. DID XML, PA-AF file attribute model metadata, and MPEG-7 metadata). With the configuration manager, the default setting for the packager/authoring tool can be customized. The pre-processing tool manager provides interfaces to external pre-processing tools, such as lossless compression tools, protection/encryption tools, and integrity check tools. For example, an external protection/encryption tool manages the protection of selected (or all) contents by providing encryption and provides all pertinent information to generate appropriate MPEG-21 IPMP and/or REL metadata. All the folder structure and file attributes information analyzed by the file manager and the information related to external tools are collected by the metadata generator to create MPEG-7 and MPEG-21 metadata and finally packaged into the MPEG-21 file format by the file packager.

11.1.2 Software Modules

The authoring tool software is constructed from the modules as shown in Figure AMD1.2. It is based on the conformance point of the PA-AF as specified in Clause 10. The basis module consists of the PA-AF file attribute model generator, MPEG-21 DID/DII generator, and MPEG-7 content information generator, as required by conformance point 1. It also includes the file manager, the MPEG-21 file format handler/packager, module, and file manager library.

The module for creating a PA-AF file conforming to conformation point 2 includes the basis module with the MPEG-21 IPMP generator. The module for creating a PA-AF file conforming to conformation point 3 includes the basis module with the MPEG-21 REL generator. The module for creating a PA-AF file conforming to conformation point 4 includes the basis module with the MPEG-7 MDS generator. Finally the module for creating a PA-AF file conforming to conformation point 5 will includes all modules aforementioned.

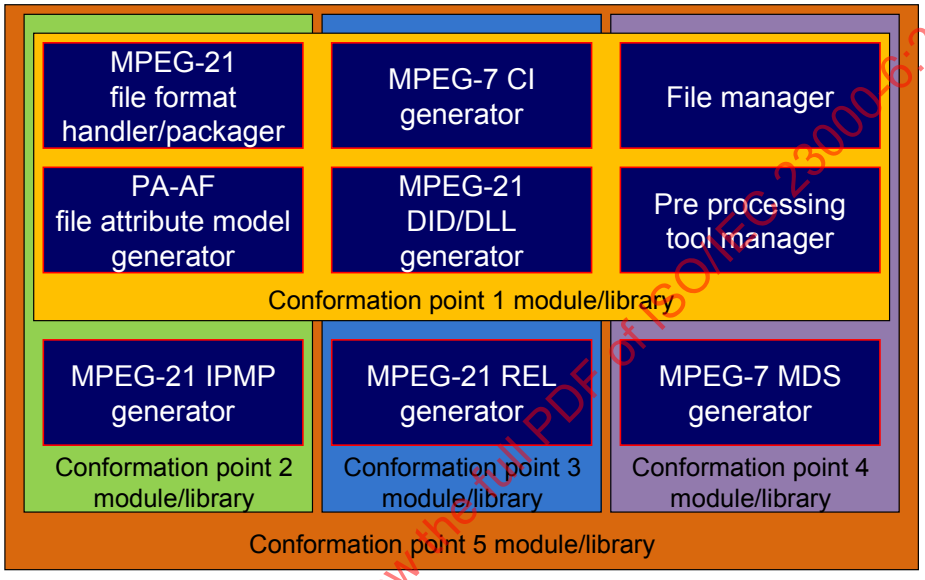

Figure AMD1.2 — PA-AF packager/authoring tool software modules

11.2 PA-AF File Extractor

The PA-AF file extractor is an application for extracting (un-archiving) file(s) from a PA-AF file. The file extractor will contain the following features:

1. File manager and content manager to handle archived files on the basis of information parsed from MPEG-21 and MPEG-7 metadata
2. Metadata parser to parse PA-AF file attribute model metadata, MPEG-21, and MPEG-7 metadata
3. File extractor to unpack the contents
4. Additional managing modules/library for content-specific post-processing tools, dissemination tools, media player, etc.

11.2.1 Architecture

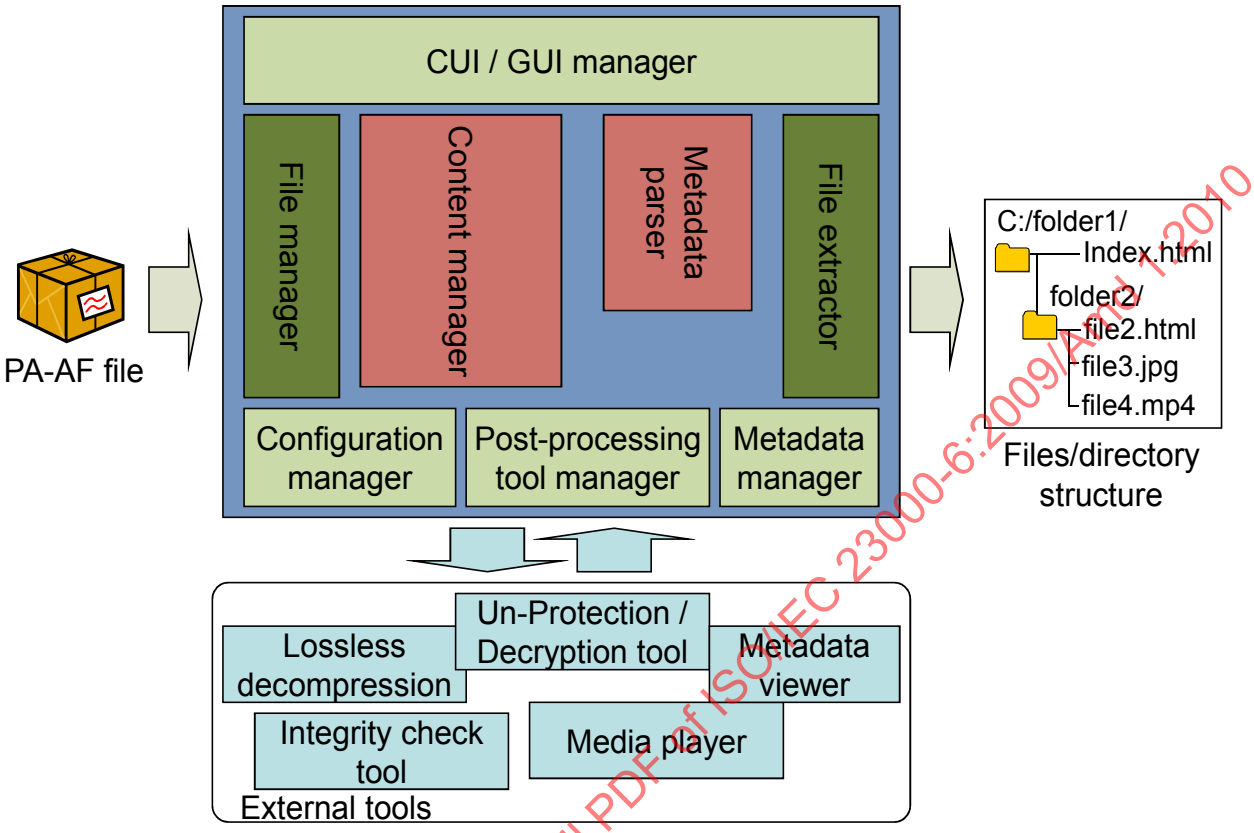

Figure AMD1.3 — PA-AF file extractor system architecture

The file extractor system architecture is shown in Figure AMD1.3. The content manager and the file extractor extract the information from the PA AF file. Any metadata is parsed according to its type (MPEG-21 DID/DII, MPEG-21 IPMP, MPEG-21 REL, MPEG-7 CI, and MPEG-7 MDS) by the metadata parser. With the configuration manager, the default setting for the extractor can be customized. The post-processing tool manager provides interfaces to external post-processing tools, such as lossless decompression tools, un-protection/decryption tools, and integrity check tool. For example, an external un-protection/decryption tool will unprotect the content on the basis of the information given in the file. The content manager lists and manages the content into files and directory structure.

11.2.2 Software Modules

The software modules of file extractor are similar to those of the packager/authoring tool but with reversed functions such that the metadata generator becomes that metadata parser; the pre-processing tool manager becomes the post-processing tool manager, and so forth. The modules are shown in Figure AMD1.4.

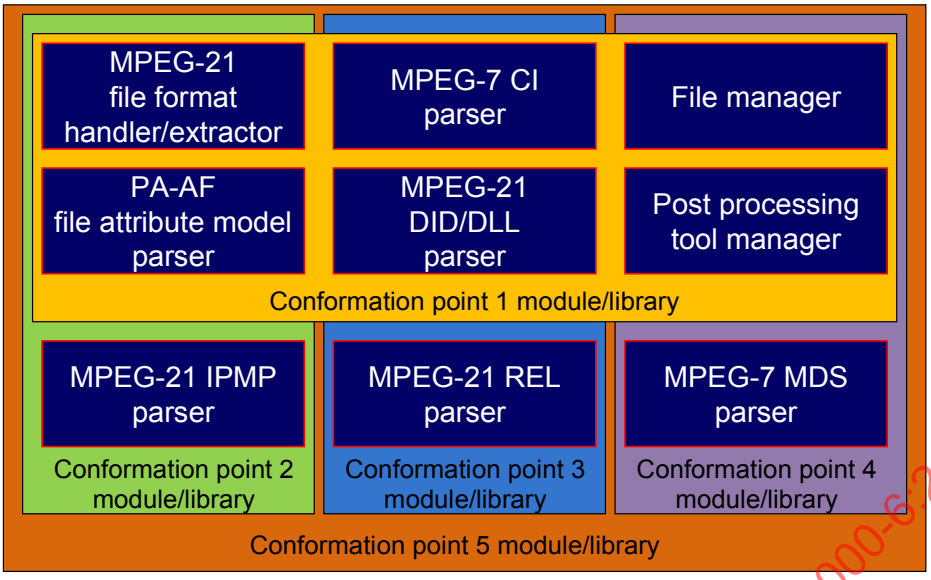

Figure AMD1.4 — A PA-AF file extractor software modules

After Annex G, add the following new annex.:

Annex H
(informative)

Implementation of Authoring Tool and File Extractor

H.1 General

This Annex provides description of an example PA-AF API design and the implementation of software that provides functionality for the authoring tool and file extractor.

Software platform:
The PA-AF API library and a sample CUI application tool were implemented and tested on the following software platforms.

— Microsoft Visual C++ 2003, 2005 on Windows XP operating system.

— gcc ver 4.1.2 on Linux (Cent OS 5.2) system.

— gcc ver 4.0.1 on Mac OS X 10.5.7 system.

The GUI application tool was implemented and tested on the following software platform: Microsoft Visual C++ 2003 on Windows XP operating system.

Features:
Implementations of PA-AF API library and sample CUI and GUI application software compliant with the conformance points 1 to 5 have the following features:

PA-AF API library:
1. Packages archive into PA-AF file format
2. Extracts PA-AF file archive
3. Enables any pre-processing tools and post-processing tools
4. Enables access to any archived file and meta-information

CUI and GUI application:
1. Packages archive into PA-AF file format
2. Extracts PA-AF file archive and displays corresponding metadata of the contents
3. Enables application of any pre-processing tool and post-processing tool
4. Enables application of encryption and decryption tools with IPMP descriptors
5. Enables application of integrity checking tools with IPMP descriptors
6. Annotates sets of MPEG-7 metadata descriptions
7. Enables inclusion of MPEG-21 REL metadata in the .paf package
8. Configures the tool settings using a .conf file

H.2 Overview of sample PA-AF API structure

Figure H.1 shows overview of a sample PA-AF API structure and its implementations.

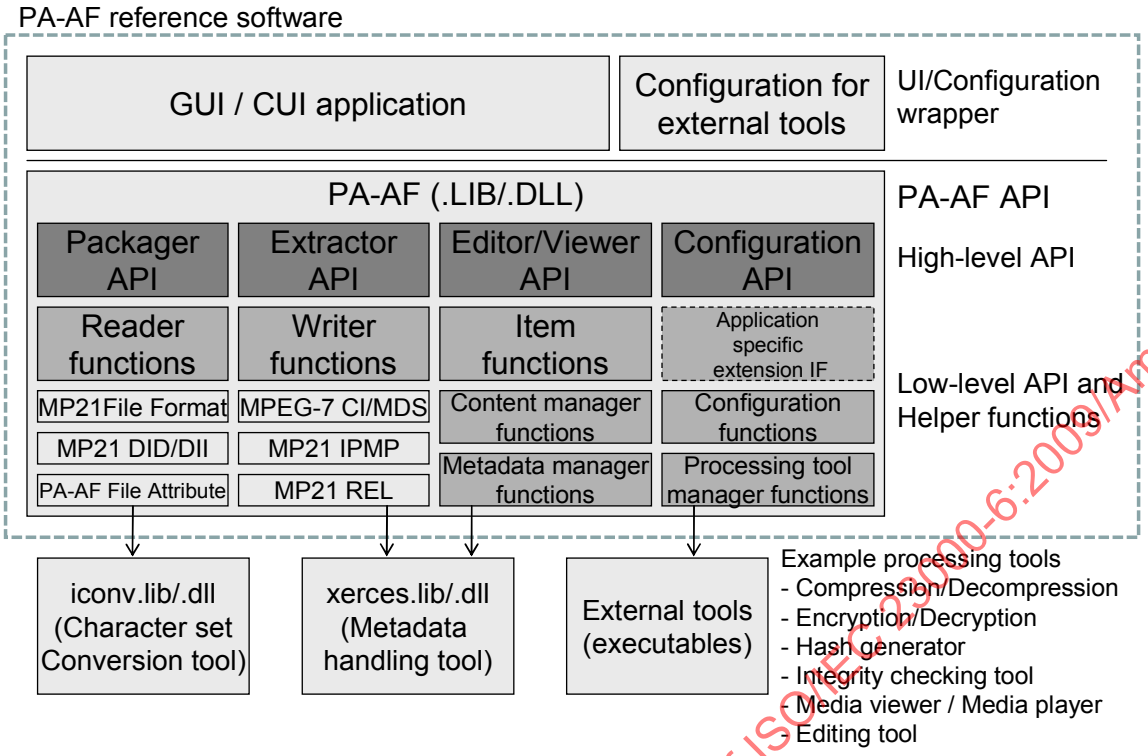

Figure H.1 — Overview of a sample PA-AF API structure

H.3 Implementation of an example CUI application

A sample CUI application was implemented using the PA-AF API library. The tool takes some command line options and generates a PA-AF package file and extracts it back to its original files.

Any kind of tools can be used as pre-processing and post-processing tools.

H.4 Implementation of an example GUI application

Figure H.2 shows the main window design of a sample GUI application that implements the authoring tool.

To archive files or files in a directory into a single PA-AF file, users can simply drag the desired files or directories into the file list box; in addition to dragging, users can also add file to be archived using the “File -> Add file” menu, The list box will display the files as shown in Figure H.2.