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**Information technology — Coded representation of immersive media — Part 37: Conformance and reference software for carriage of haptics data**

WD stage

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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

A list of all parts in the ISO 23090 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](https://www.iso.org/members.html) and [www.iec.ch/national-committees](https://www.iec.ch/national-committees).

Introduction

The conformance and reference software in this document serves two main purposes:

— Validation of the written specification of ISO/IEC 23090-32;

— Conformance testing for checking interoperability for the various applications against the reference software which aims to be compliant with ISO/IEC 23090-32.

The reference software is structured as an extension of the ISOBMFF reference software library and provides additional functions required for ISO/IEC 23090-32. In addition, it includes a small command line application that uses the library to perform some basic file operations such as multiplexing and demultiplexing a file.

Furthermore, this document is accompanied by a collection of conformance files. These files provide practical demonstrations of various features of ISO/IEC 23090-32, aiding in a more comprehensive understanding and application of ISO/IEC 23090-32.

Information technology — Coded representation of immersive media — Part 37: Conformance and reference software for carriage of haptics data

# Scope

This document specifies the reference software for carriage of haptics data as specified in ISO/IEC 23090-32. The information provided describes the reference software modules and the features that it supports. It also provides a description of how the reference software can be utilized. Finally, it also provides a description of conformance test vectors.

# Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

* ISO/IEC 23090-32, Information technology — Coded representation of immersive media — Part 32: Carriage of Haptics data

# Terms and definitions

No terms and definitions are listed in this document.(TBD)

[Editor’s Note: We may revisit in the future.]

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at [https://www.iso.org/obp](https://www.iso.org/obp/ui)

— IEC Electropedia: available at <https://www.electropedia.org/>

# Abbreviated terms

ISOBMFF ISO base media file format

# Reference software for ISO/IEC 23090-32

## Overview

Figure 1 shows a simplified overview of the reference software implementation architecture for the carriage of haptics data. The reference software implementation implements the features defined in ISO/IEC 23090-32 and is based on the reference software for ISOBMFF (*libisomediafile*) specified in ISO/IEC 14496-32 [3], the reference software for haptics coding [2], and other supporting libraries such as *libspdlog*, which is TBD. Boxes with a gray background in Figure 1 are part of the scope of the reference software implementation and are described in more detail in the following sections.

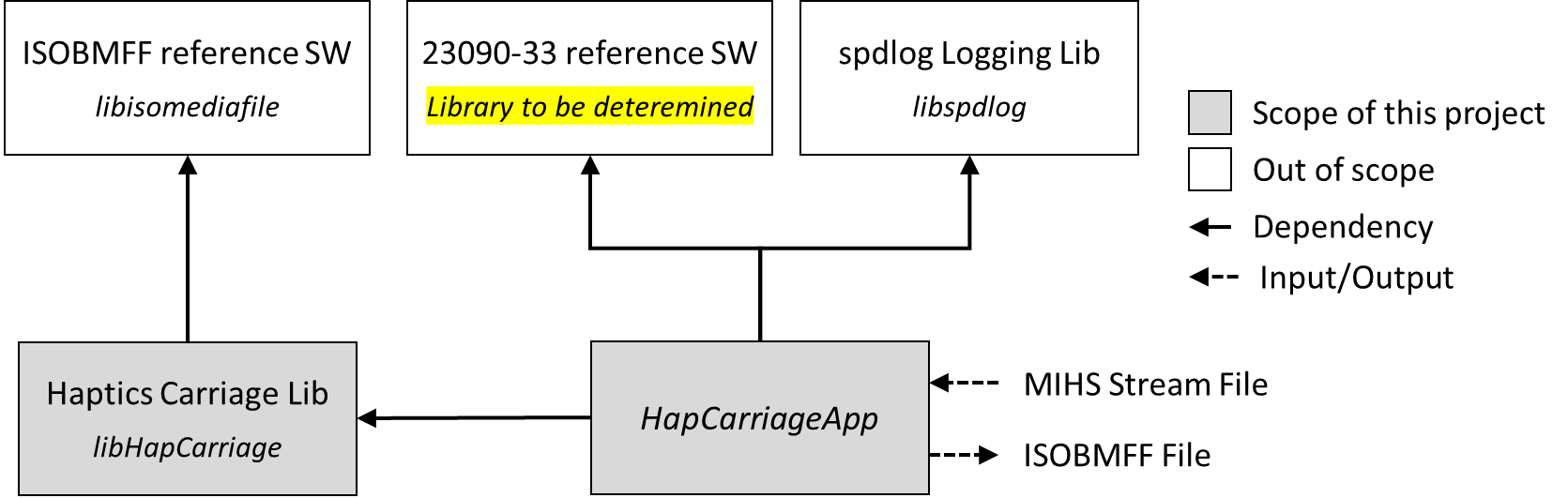


Figure 1 Reference software overview

The haptics carriage library *libHapCarriage* would extend the *libisomediafile* by defining and implementing Haptics related boxes and providing a public API which can be used by applications in order to write and parse the corresponding syntax elements.

The *HapCarriageApp* is a command line application which uses *libHapCarriage* and the library in reference software for haptics coding[2] to multiplex and demultiplex Haptics MIHS bitstreams and the associated metadata. This would also use 3rd party library such as *libspdlog* [4]. (TBD)

[Editor’s Note: It will be determined which library in reference software for haptics coding [2] could be used for this *HapCarriageApp*. In addition, it would be also considered whether that library needs to be extended or not.]

## Features list

Table 1 summarizes a list of features defined in ISO/IEC 23090-32 and indicates which features are currently supported by the reference software.

[Editors’ Note: Text of ISO/IEC FDIS 23090-32 Carriage of haptics was issued at MPEG#148 meeting. Following reference software feature list is updated by applying FDIS text]

Table 1 Reference software feature list

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Feature** | | **4CCs** | **Version** | **Status** |
| Haptics media handler type | | hapt |  | \*1 |
| Haptics media header (NullMediaHeaderBox) | | nmhd | 0 | \*1 |
| Haptics sample entry | |  | 0 | \*1 |
| Single track | MIHS sample entry | mih1 | 0 | 🗶 |
| MIHS configuration Box | mh1C | 0 | 🗶 |
| Haptics Experience Description Box | hexd | 0 | 🗶 |
| Haptic Experience Description Header Box | hexh | 0 | 🗶 |
| Haptic Avatar Description Box | havd | 0 | 🗶 |
| Haptic Perception Description Box | hprd | 0 | 🗶 |
| Haptic Perception Description Header Box | hprh | 0 | 🗶 |
| Haptic Reference Device Description Box | hrdd | 0 | 🗶 |
| Haptic Channel Description Box | hchd | 0 | 🗶 |
| Haptic Channel Description Header Box | hchh | 0 | 🗶 |
| Multiplexer | N/A |  | 🗶 |
| Demultiplexer | N/A |  | 🗶 |
| Common | Haptic Band Description Box | hbnd | 0 | 🗶 |
| Haptics Presentation Dep Group Entry | mhpg | 0 | 🗶 |
| Track Reference Type (synchronization with other media) | rsyn | - | \*1 |
| Haptics Silent Unit Sample Group Entry | mhsu | 0 | 🗶 |
| MIHS sample format |  |  | 🗶 |
| MIHS sync sample |  |  | 🗶 |
| Multi-track | MIHS band sample entry | mhb1 | 0 | 🗶 |
| Haptic Band Configuration Box | mibC | 0 | 🗶 |
| Multiplexer | N/A |  | 🗶 |
| Demultiplexer | N/A |  | 🗶 |
| MIHS Band Group Box  (Entity To Group Box) | mhbd |  | 🗶 |
| Track Reference Type  (Referring MIHS band track) | mhbd | - | \*1 |

[Editors’ Note: Status =\*1 indicates that this may be in libisomediafile. Need to be checked.]

## Haptics carriage library API

(TBD)

# Conformance for ISO/IEC 23090-32

(TBD) MP4 Files, fMP4 Files and DASH MPD Files

1. (informative)  
     
   Reference software development process

[Editors’ note: This annex would be removed when CD will be issued.]

* 1. General

This annex describes the reference software development process.

* + 1. Reference software development process

The development process of the reference software builds on the successes of previous reference software implementations in WG03 and learns from the mistakes that were encountered while working on similar projects for other MPEG Systems specifications. The software implementation will attempt to utilize existing relevant implementations and libraries from WG03.

The reference software implementation should have a modular design that enables the collaborators to progress the work rapidly and to work on the implementation of different features and modules in parallel. Moreover, the development process would involve code reviews by other collaborators and it will be required that the code passes implemented test cases before merging any newly implemented feature.

One important aspect for the successful and the rapid progress of the reference software development is the participation of all proponents of technologies that were adopted in the ISO/IEC 23090-32 specification. Towards this end, and to not repeat mistakes that were made in other reference software projects, and based on agreements by the haptics group, technologies from ISO/IEC 23090-32 for which the proponents do not provide implementations may be removed. This process has been strictly followed in other MPEG specifications.

Bibliography

1. ISO/IEC 23090-31, Information technology — Coded Representation of Immersive Media — Part 31: Haptics coding
2. ISO/IEC 23090-33, Information technology — Coded Representation of Immersive Media — Part 33: Conformance and reference software for haptics coding
3. ISO/IEC 14496-32, Information technology — Coding of audio-visual objects — Part 32: File format reference software and conformance
4. spdlog, Online: https://github.com/gabime/spdlog.