

~~Reference number of working document: ISO/IEC FDIS 18181-2~~

~~ISO/IEC JTC 1/SC 29/WG 1 N100647~~

~~Date: 2023-11-03~~

~~Reference number of project: ISO/IEC/FDIS 18181-2~~

~~Committee identification: ISO/JTC 1/SC 29/WG 1~~

~~Secretariat: JISC~~

~~Date: 2024-01-17~~

~~Information technology — JPEG XL image coding system —~~

**Part 2:
File format**

~~Technologies de l'information — l'information - Système de codage d'images JPEG XL —~~

~~Partie 2: Format de fichiers~~

~~ISO/IEC FDIS 18181-2~~

~~<https://standards.iteh.ai/catalog/standards/iso/2f21649d-1619-47a6-9051-3dde2ad7f81/iso-iec-fdis-18181-2>~~

FDIS stage

ISO/IEC/~~DIS~~ FDIS 18181-2:2023(~~E~~2024(en)

© ISO/IEC ~~2023~~2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
EmailE-mail: copyright@iso.org
Website: www.iso.org www.iso.org

Published in Switzerland

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/IEC FDIS 18181-2

<https://standards.iteh.ai/catalog/standards/iso/2f21649d-1619-47a6-9051-3ddde2ad7f81/iso-iec-fdis-18181-2>

Contents

Forewordv

1 Scope1

2 Normative references1

3 Terms and definitions1

4 General2

5 File organization2

6 Data types and numerical values3

7 Graphical descriptions4

8 Binary format of a box4

9 Box types5

9.1 JPEG XL Signature box5

9.2 File Type box5

9.3 Level box5

9.4 JUMBF box6

9.5 Exif box6

9.6 XML box6

9.7 Brotli-compressed box6

9.8 Frame Index box7

9.9 JPEG XL Codestream box8

9.10 JPEG XL Partial Codestream box8

9.11 JPEG Bitstream Reconstruction Data box8

Annex A (informative) JPEG Bitstream Reconstruction procedure12

A.1 General12

A.2 SOF segment12

A.3 DHT segment12

A.4 RSTn segment13

A.5 EOI segment13

A.6 SOS segment13

A.7 DQT segment14

A.8 DRI segment14

A.9 APPn segment14

A.10 COM segment15

A.11 Unrecognized data segment15

Annex B (informative) JPEG XL Media Type registration16

B.1 General16

B.2 Registration16

Bibliography18

ISO/IEC/~~DIS~~ **FDIS** 18181-2:2023(~~E~~**2024(en)**)

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

ISO/IEC FDIS 18181-2

<https://standards.itih.ai/catalog/standards/iso/2f21649d-1619-47a6-9051-3ddde2ad7f81/iso-iec-fdis-18181-2>

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and <https://patents.iec.ch>. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

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*.

This second edition cancels and replaces the first edition (ISO/IEC 18181-2:2021), which has been technically revised.

The main changes are as follows:

- ~~—~~ Cross-references to ISO/IEC 18181-1 are updated to match its second edition;
- ~~—~~ The JPEG bitstream reconstruction procedure was moved to ~~an Annex (Annex A)~~ **Annex A** and revised to improve clarity;
- ~~—~~ **Annex B** ~~Annex B~~ was added, specifying the `image/jxl` media type registration.

A list of all parts in the ISO/IEC 18181 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.

Field Code Changed

Information technology — JPEG XL image coding system

Part 2: File format

1 ~~1~~ Scope

This document specifies the transport and container formats for JPEG XL codestreams as specified in ~~ISO/IEC 18181-1~~¹⁾ ~~ISO/IEC 18181-1~~. This document specifies how to add metadata and extensions to JPEG XL codestreams. A file as described by this document is called a JPEG XL file.

2 ~~2~~ 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. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

~~ISO/IEC 18181-1~~²⁾ ~~ISO/IEC 18181-1~~, *Information technology — JPEG XL Image Coding System — Part 1: Core coding system*

~~ISO/IEC 10198-1:1994~~, *Information technology — Digital compression and coding of continuous-tone still images: Requirements and guidelines*

~~ISO/IEC 19566-5~~, *Information technologies — JPEG systems — Part 5: JPEG universal metadata box format (JUMBF)*

IETF RFC 7932, ~~J. ALAKUIJALA, & Z. SZABADKA~~, *BroTLI Compressed Data Format*, RFC Series. Available from: ~~<https://www.rfc-editor.org/info/rfc7932>~~³⁾

3 ~~3~~ Terms and definitions

For the purposes of this document, the following terms and definitions apply. ~~1619-47a6-9051-3ddde2ad7f81/iso-iec-fdis-18181-2~~

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

3.1 box

structured collection of data describing the image or the image decoding process

3.2 box content

data wrapped within the box structure

¹⁾Second edition, under preparation. Stage at the time of publication: ISO/IEC CD 18181:2023

²⁾Second edition, under preparation. Stage at the time of publication: ISO/IEC CD 18181:2023

³⁾ <https://www.rfc-editor.org/info/rfc7932>.

ISO/IEC FDIS 18181-2:2024(en)

3.3

box type

kind of information stored within the box

3.4

file format

set of data structures for the storage of metadata and extensions of a codestream

3.5

JPEG XL file

data file encoded in the file format defined by this document

3.6

superbox

box that carries other boxes as payload data

4 **General**

This document defines the file format of a JPEG XL file.

A JPEG XL file shall contain a codestream as specified in ~~ISO/IEC 18181-1~~; ISO/IEC 18181-1 and may contain additional metadata and extensions.

A JPEG XL file shall come in one of the following forms:

- ~~Clause 5~~—A box structure, as defined in ~~Clause 5~~ Clause 5.
- ~~Clause 5~~—A direct JPEG XL codestream without box structure

The rest of this document only defines the box structure, the codestream without box structure is valid but is completely specified in ~~ISO/IEC 18181-1~~; ISO/IEC 18181-1.

A decoder shall require the file format to follow either the structure of a codestream without box structure, or follow the box structure as defined in ~~Clause 5~~ Clause 5 and follow all box requirements in ~~Clauses 6~~ Clauses 6 to 9. A decoder can extract the codestream from the box structure and decode the image from the codestream using the procedure specified in ~~ISO/IEC 18181-1~~; ISO/IEC 18181-1 and can decode the contents of other boxes following their respective specifications in this document.

NOTE A direct JPEG XL codestream without box structure is also a valid JPEG XL file. This allows, for example, a more efficient encoding of images for the web, in cases where information encoded in other boxes than the codestream is not required.

5 **File organization**

A JPEG XL file using the box structure is formed as a series of boxes. These boxes contain all data within the file, including the initial signature required by the file format.

NOTE This box-based file format is based on the same syntax as described in ISO/IEC 15444-1:2019, Annex I; ISO/IEC 15444-1:2019, Annex I or ISO/IEC 15444-2:2021, Annex M; ISO/IEC 15444-2:2021, Annex M, or ISO/IEC 21122-3; ISO/IEC 21122-3. The binary format of a box is also described in Clause 8.

Boxes of different types contain different types of data, such as the file signature, metadata and the codestream. Clause 9 Clause 9 defines box types that may appear in a JPEG XL file and their requirements. Boxes with an unrecognized type shall be ignored and skipped by the decoder.

A JPEG XL file shall contain a JPEG XL codestream. The codestream can be split across multiple boxes: JPEG XL partial codestream boxes. In this case, the codestream is formed by the concatenation of the content of all those boxes.

ISO/IEC FDIS 18181-2:2024(en)

Any boxes, content and codestreams present in a superbox, such as another JPEG XL file in a JUMBF superbox, shall not be taken into account for the syntactic requirements of this document; they recursively follow their applicable specification.

Tables 1 and 2 each show a conceptual box structure of a JPEG XL file, that is a possible series of different box types that form the file, respectively with a single full codestream box and with multiple partial codestream boxes. Boxes that may appear multiple times are indicated with '...', optional boxes are indicated with brackets and required boxes are indicated in **bold**. These figures are only an indication and do not imply any ordering or counting requirements for the boxes. The decoder shall not make any assumptions about the ordering of any boxes after the first two, except where indicated.

Table 1 — Conceptual structure (example) of a JPEG XL file using a full codestream box

JPEG XL Signature box
File Type box
Level box
(JPEG XL Frame Index box)
JPEG XL Codestream box
(JUMBF box) ...
(Brotli-compressed box containing Exif)
(XML box) ...
(Brotli-compressed box containing XML)
(JPEG Bitstream Reconstruction box)

Table 2 — Conceptual structure (example) of a JPEG XL file using partial codestream boxes

JPEG XL Signature box
File Type box
JPEG XL Partial Codestream box ...
(JPEG XL Frame Index box)
JPEG XL Partial Codestream box ...
(JUMBF box) ...
(Exif box)
JPEG XL Partial Codestream box ...
(XML box) ...

6 Data types and numerical values

Data types used in this document shall be interpreted by the decoder as follows:

- **u32**: a 32-bit unsigned integer encoded in big endian order (4-bytes).
- **u64**: a 64-bit unsigned integer encoded in big endian order (8-bytes).
- **Varint()**: an unsigned integer value of up to 63-bits as a variable length integer in little endian order as specified in [18181-1 E.4.2](#) / [ISO/IEC 18181-1:—, E.4.2](#).
- **U32(), u(n), Bool**: as specified in [18181-1 B.2](#) / [ISO/IEC 18181-1:—, B.2](#).

ISO/IEC FDIS 18181-2:2024(en)

Numerical values for bytes are given as hexadecimal values, each individually prefixed by 0x. Hexadecimal byte values are given in the order as they appear in the file. In some cases, these bytes spell out text in ASCII, this is informatively indicated after the hexadecimal values.

7 Graphical descriptions

Box definitions contain graphical description tables to illustrate the structure of the box. These tables should be interpreted as follows.

- A sequence of columns is used to indicate the fields of the box and their order (from left to right).
- Optional fields are indicated with brackets.
- Underline indicates a variable length field. Exact data types or sizes are indicated by name either in the rectangle after the name of the field, or in a description of the fields outside of the table.
- Multi-column headers may show fields that are grouped in a larger named structure.

Table 3 shows an example of a box with 3 fields:

- A: a name given to a group of the three fields contained within.
- B: required field with a fixed length data type: the type u32
- C: optional field with a fixed length data type (e.g. u32, u64 or a fixed amount of bytes)
- D: required field with a variable length data type (such as Varint(), or remaining amount of bytes)

Table-3 — Example of a graphical description of a box definition

A		
B: u32	(C)	D

8 Binary format of a box

Each box shall have the structure indicated in Table 4. This structure consists of a header indicating size and box type, and box content.

NOTE 1 This format is also specified in [ISO/IEC 15444-1:2019](#) and [ISO/IEC 15444-2:2021](#), [ISO/IEC 15444-1:2019](#) and [ISO/IEC 15444-2:2021](#).

Table-4 — Binary format of a box

Box header			Box content
LBox: u32	TBox: 4_bytes	(XLBox: u64)	<u>DBox: remaining</u> bytes

The fields given in Table 4 are the following:

- LBox: has type u32. Gives the size of the box in bytes, including the box header fields. If the value is 1, then XLBox is used instead to indicate the size of the box. If the value is 0, then this box is the last box of the file, and its data extends to the end of the file. If the value is not 0 or 1, it shall be at least 8.
- TBox: has 4_bytes (e.g. a FourCC code): box type, specifies the type of information found in the box content, e.g. whether it is a JPEG XL Signature box, a File Type box, and so on.