International Standard

ISO/IEC 15444-16

Information technology — JPEG 2000 image coding system —

Part 16: Enhanced encapsulation of JPEG 2000 images into ISO/IEC 14496-12

Third edition
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This document was prepared by ITU-T (as ITU-T T.815) and drafted in accordance with its editorial rules, in collaboration with Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This third edition cancels and replaces the second edition (ISO/IEC 15444-16:2021), which has been technically revised.

The main changes are as follows:

— adds more flexible signalling of colour information;
— explicitly specifies the encapsulation of JPEG 2000 images into ISO/IEC 14496-12;
— defines the structures necessary to implement JPEG 2000 video tracks.

A list of all parts in the ISO/IEC 15444-16 series can be found on the ISO and IEC websites.

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INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

Information technology – JPEG 2000 image coding system: Enhanced encapsulation of JPEG 2000 images into ISO/IEC 14496-12

1 Scope

This Recommendation | International Standard specifies the encapsulation of codestreams specified in the JPEG 2000 family of Recommendations | International Standards into file formats derived from ISO/IEC 14496-12, including the file format specified in ISO/IEC 23008-12.

2 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. At the time of publication, the editions indicated in dated references were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.1 Identical Recommendations | International Standards

- Recommendation ITU-T T.800 (in force) | ISO/IEC 15444-1 (in force), *Information technology – JPEG 2000 image coding system: Core coding system*.
- Recommendation ITU-T T.801 (in force) | ISO/IEC 15444-2 (in force), *Information technology – JPEG 2000 image coding system: Extensions*.

2.2 Paired Recommendations | International Standards equivalent in technical content

None.

2.3 Additional references

- ISO/IEC 14496-12 (in force), *Information technology – Coding of audio-visual objects – Part 12: ISO base media file format*.
- ISO/IEC 23008-12 (in force), *Information technology – High efficiency coding and media delivery in heterogeneous environments – Part 12: Image file format*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation | International Standard uses the following terms defined elsewhere:

For the purposes of this Recommendation | International Standard, the definitions given in ISO/IEC 23008-12, ISO/IEC 14496-12, Rec. ITU-T T.800 | ISO/IEC 15444-1 and Rec. ITU-T T.801 | ISO/IEC 15444-2 apply. ITU, ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ITU terminology database: https://www.itu.int/go/terms
- ISO Online browsing platform: https://www.iso.org/obp
- IEC Electropedia: http://www.electropedia.org/

3.2 Terms defined in this Recommendation | International Standard

This Recommendation | International Standard defines the following term:

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3.2.1 JPEG 2000 codestream: Sequence of bits between, and including, the start of codestream marker and end of codestream marker.

NOTE 1 – The general structure of the JPEG 2000 codestream is specified in Rec. ITU-T T.800 | ISO/IEC 15444-1, with other parts of the JPEG 2000 family of Recommendations | International Standards extending and constraining this structure.

NOTE 2 – The start of codestream marker and end of codestream marker are defined in Rec. ITU-T T.800 | ISO/IEC 15444-1.

4 Abbreviations

For the purposes of this Recommendation | International Standard, the following abbreviations apply:

JPEG Joint Photographic Experts Group

5 Conventions

The syntax of boxes specified by this Recommendation | International Standard follows the conventions specified in ISO/IEC 14496-12.

6 Encapsulation of JPEG 2000 images and image collections

6.1 General

This clause specifies the encapsulation of individual JPEG 2000 codestreams as individual images, image collections, image sequences, and as video tracks, as specified in ISO/IEC 14496-12 and ISO/IEC 23008-12.

6.2 JPEG 2000 coded image item

A JPEG 2000 coded image item is a coded image item, as defined in ISO/IEC 23008-12, with type `'j2k1'` that conforms to the provisions of this subclause.

The body of the coded image item shall be exactly one Contiguous Codestream box as specified in Rec. ITU-T T.800 | ISO/IEC 15444-1.

NOTE 1 – The processing of JPEG 2000 codestream contained in the Contiguous Codestream box can require capabilities not defined in Rec. ITU-T T.800 | ISO/IEC 15444-1, including those specified in Rec. ITU-T T.814 | ISO/IEC 15444-15. Such required capabilities are signalled in the Rsiz field and CAP Marker Segment specified in Rec. ITU-T T.800 | ISO/IEC 15444-1. In other words, all JPEG 2000 codestreams are stored in the same JPEG 2000 coded image item regardless of capabilities required to process them.

The coded image item shall be associated with exactly one `'j2kH'` item property specified in 6.3, and the `essential` field of the item property shall be equal to 1.

For compatibility with previous editions of this Recommendation | International Standard, the coded image item should be associated with a `'colr'` item property.

NOTE 2 – Previous editions of this Recommendation | International Standard required the coded image item to be associated with exactly one `'colr'` item property. This constraint was relaxed to allow the richer options offered by the `colour` field (6.3.7).

If a `'pixi'` item property is associated with the coded image item, its information shall be consistent with the $\texttt{Ssiz}^i$ fields of the `SIZ` marker of the JPEG 2000 codestream within the Contiguous Codestream box.

If a `'pasp'` item property is associated with the coded image item, its information should be consistent with the Resolution box, if present, of the JPEG 2000 header item property.

If a `'lsel'` item property is associated with the coded image item, then:

- the `layers` field of the JPEG 2000 header item property shall be present and contain an entry with a `layer_id` field equal to that of the `'lsel'` item property; and
- the decoded image shall be the result of decoding the layer identified by the `layer_id` field of the `'lsel'` item property.

The `image_width` and `image_height` fields of the `'ispe'` item property shall be equal to Xsiz − XOsiz and Ysiz − YOsiz, respectively, where Xsiz, XOsiz, Ysiz and YOsiz are found in the SIZ marker in the associated one or more codestreams.

NOTE 3 – Item properties other than those referenced above can be associated with the coded image item.

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