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SERIES T: TERMINALS FOR TELEMATIC SERVICES

Still-image compression – JPEG 2000

Information technology – JPEG 2000 image coding system – Encapsulation of JPEG 2000 images into ISO/IEC 23008-12

Recommendation ITU-T T.815

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INTERNATIONAL STANDARD ISO/IEC 15444-16
RECOMMENDATION ITU-T T.815

Information technology – JPEG 2000 image coding system – Encapsulation of JPEG 2000 images into ISO/IEC 23008-12

Summary

ISO/IEC 23008-12 specifies a framework for the interchange of images and image sequences using tools defined in the International Organization for Standardization (ISO) base media file format (ISO/IEC 14496-12), which is commonly used worldwide. This framework is defined independently of the formats of the images and image sequences, allowing a wide range of such formats to be used in combination with ISO/IEC 23008-12.

To simplify the use of the JPEG 2000 family of image formats (Rec. ITU-T T.8xx series | ISO/IEC 15444) in applications that use the ISO base media file format, this Recommendation | International Standard specifies the encapsulation of these image formats in the framework defined in ISO/IEC 23008-12.

Recommendation ITU-T T.815 (2019) is a common text with ISO/IEC 15444-16:2019, both in their first edition.

History

Edition	Recommendation	Approval	Study Group	Unique ID[*]
1.0	ITU-T T.815	2019-06-13	16	11.1002/1000/13913

Keywords

Images, ISO base media file format, JPEG 2000.

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[*] To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Information technology – JPEG 2000 image coding system – Encapsulation of JPEG 2000 images into ISO/IEC 23008-12

1 Scope

This Recommendation | International Standard specifies the encapsulation of image formats specified in the JPEG 2000 family of Recommendations | International Standards in the framework defined 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 (latest) | ISO/IEC 15444-1: (latest), *Information technology – JPEG 2000 image coding system – Core coding system*.

– Recommendation ITU-T T.802 (latest) | ISO/IEC 15444-3: (latest), *Information technology – JPEG 2000 image coding system – Motion JPEG 2000*.

2.2 Paired Recommendations | International Standards equivalent in technical content

None.

2.3 Additional references

– ISO/IEC 23008-12:2017, *Information technology – High efficiency coding and media delivery in heterogeneous environments – Part12: 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 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 terms:

None.

4 Abbreviations

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

JPEG   Joint Photographic Experts Group

5 Conventions

None.

6 Encapsulation of Rec. ITU-T T.800 | ISO/IEC 15444-1 images and image collections

6.1 General

This clause specifies the encapsulation of images and image collections that conform to Rec. ITU-T T.800 | ISO/IEC 15444-1 in the file format specified by ISO/IEC 23008-12, which specifies a framework for the interchange of images and image sequences using tools defined in the ISO base media file format (ISO/IEC 14496-12).

A "crop-rotate-mirror derived image item" is specified as a derived image item of type 'iden' that is associated only with the following essential item properties: 'irot', 'clap', and 'imir'.

A "flexible image item" is specified as (a) either the primary item or any item from the alternate group containing the primary item, which (b) fulfils one of the following constraints:

- the item is a coded image item; or
- the item is a crop-rotate-mirror derived image item, and each source image item of the item is either (i) a crop-rotate-mirror derived image item or (ii) a coded image item.

The type of a flexible image item is specified as the type of the associated coded image item or source image item of the associated crop-rotate-mirror derived image item.

Clause 6 of ISO/IEC 23008-12:2017 shall apply.

6.2 Coded image item

6.2.1 JPEG 2000 header item property

Box Type: 'j2kH'
Property Type: Descriptive item property
Container: ItemPropertyContainerBox
Mandatory (per an item):   Yes, for an image item of type 'j2k1'
Quantity (per an item):   One for an image item of type 'j2k1'

The essential property associated with the item shall be equal to 1 for a 'j2kH' item property associated with an image item of type 'j2k1'.

The body of this property consists of the permissible contents of a JP2 Header box as specified in Rec. ITU-T T.800 | ISO/IEC 15444-1.

6.2.2 Definition

A coded image item with type 'j2k1':

- shall have a body that is a Contiguous Codestream box as specified in Rec. ITU-T T.800 | ISO/IEC 15444-1;
- shall be associated with exactly one JPEG 2000 header item property specified in 6.2.1;

6.3 File conformance

This clause specifies requirements for a file that conforms to the 'j2ki' brand.

The file shall conform to the 'mif1' brand as specified in ISO/IEC 23008-12.

The file shall include 'j2ki' as a compatible brand.

The file shall contain one or more flexible image items of type 'j2k1' as specified in 6.2.2.

6.4   Reader conformance

This clause specifies requirements for a reader that conforms to the 'j2ki' brand.

The reader shall support displaying flexible image items of type 'j2k1' as specified in 6.2.2.

The reader should support all capabilities specified by Rec. ITU-T T.800 | ISO/IEC 15444-1.

The reader should support displaying an image with opacity information defined by an associated auxiliary image of aux_type equal to urn:mpeg:hevc:2015:auxid:1, as specified in ISO/IEC 23000-12.

The reader shall support the following image properties specified in ISO/IEC 23000-12:

- clean aperture;
- image rotation; and
- image mirroring.

These properties, if used, shall be applied in the following order: clean aperture first, then rotation, then mirror.

6.5   Media type registration

6.5.1   General

Clause 6.5 and its subclauses are a media type specification for JPEG 2000 coded images and image collections in the image file format specified in ISO/IEC 23008-12 for use in various Internet protocols, according to the scheme defined in IETF RFC 6838 (BCP 13). Recent Internet protocols have been carefully designed to be easily extensible in certain areas, and many such protocols are capable of carrying arbitrary labelled content. The mechanism used to label such content is a media type, consisting of a top-level type, a subtype, and in some instances, optional parameters. Clause 6.5 and its subclauses specify such a content labelling scheme for JPEG 2000 coded images and image collections in the image file format specified in ISO/IEC 23008-12, to correspond with a registration in the Internet Assigned Numbers Authority (IANA) central registry.

The file extension and media type of a file in this family usually reflect the major brand in the `FileTypeBox`. When the major brand indicates a brand related to clause 6.3, the media type defined here should be used. When such a brand is a compatible brand, this media type may also be used.

6.5.2   Registration

```
Media type name: image

Subtype name: hej2k

Required parameters: None

Optional parameters: Same as for the media type image/heif. The presence of
an image item of type 'j2ki' is signalled by including, in the itemtypes
parameter, an item description whose item type string start with 'j2ki'.

Encoding considerations: binary

Security considerations: See media type image/heif. In addition, image items
of type 'j2ki' contain structures of variable length and have an extensible
syntax. Both aspects present potential security risks for implementations. In
particular, variable length structures present buffer overflow risks and
extensible syntax could result in the triggering of adverse actions.

Interoperability considerations: Same as for the media type image/heif. In
addition, image items of type 'j2ki' can conform to one of several profiles
and/or require one of several capabilities, e.g. as specified in Rec. ITU
T.800 | ISO/IEC 15444-1, not all of which are necessarily supported by a
receiving decoder. As a result, decoders might attempt to process the
contents only to determine that they cannot be rendered either partially or
in full.

Published specification: Rec. ITU-T T.815 | ISO/IEC 15444-16

Applications: Multimedia and scientific
```

```
Fragment identifier considerations: Same as for the media type image/heif

Restrictions on usage: None

Additional information:

    Deprecated alias names for this type: N/A

    Magic number(s): None

    File extension(s): hej2

    Macintosh File Type Code(s): N/A

    Object Identifiers: N/A

Intended usage: COMMON

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Author/Change controller: ITU-T & ISO/IEC JTC 1
```

7 Encapsulation of Rec. ITU-T T.802 | ISO/IEC 15444-3 image sequences

7.1 General

This clause specifies the encapsulation of images sequences that conform to Rec. ITU-T T.802 | ISO/IEC 15444-3 in the file format specified by ISO/IEC 23008-12, which specifies a framework for the interchange of images and image sequences using tools defined in the ISO base media file format (ISO/IEC 14496-12).

Clause 7 of ISO/IEC 23008-12:2017 shall apply.

7.2 Image sequence track conformance

The image sequence track shall have:

- `'mjp2'` sample entry type;
- all samples are sync samples.
- `Track_enabled` equal to 1;
- `Track_in_movie` equal to 1; and
- each of its sample entry contain a `data_reference_index` value such that it is mapped to a `DataEntryBox` with (`entry_flags` & 1) equal to 1.

A sample entry of type `'mjp2'` shall use the `MJ2SampleEntry` and sample format as specified in Rec. ITU-T T.802 | ISO/IEC 15444-3.

7.3 File conformance

This clause specifies requirements for a file that conforms to the `'j2ks'` brand.

The file shall conform to the `'msf1'` brand as specified in ISO/IEC 23008-12.

The file shall include `'j2ks'` as a compatible brand.

The file shall contain one or more image sequence track that conforms to clause 7.2.

7.4 Reader conformance

This clause specifies requirements for a reader that conforms to the `'j2ks'` brand.

The reader for the `'j2ks'` brand shall be able to display an image sequence track image sequence track that conforms to clause 7.2.

The reader should support all capabilities specified by Rec. ITU-T T.802 | ISO/IEC 15444-3 and Rec. ITU-T T.800 | ISO/IEC 15444-1.

The reader should support displaying an image with opacity information defined by an associated auxiliary image of `aux_type` equal to `urn:mpeg:hevc:2015:auxid:1`, as specified in ISO/IEC 23000-12.

The reader should support the following image properties specified in ISO/IEC 23000-12:

- clean aperture;
- image rotation; and
- image mirroring.

These properties, if used, shall be applied in the following order: clean aperture first, then rotation, then mirror.

7.5 Media type registration

7.5.1 General

Clause 7.5 and its subclauses are a media type specification for JPEG 2000 coded images and image collections in the image file format specified in ISO/IEC 23008-12 for use in various Internet protocols, according to the scheme defined in IETF RFC 6838 (BCP 13). Recent Internet protocols have been carefully designed to be easily extensible in certain areas and many such protocols are capable of carrying arbitrary labelled content. The mechanism used to label such content is a media type, consisting of a top-level type, a subtype and in some instances, optional parameters. Clause 7.5 and its subclauses specify such a content labelling scheme for motion JPEG 2000 image sequences in the image file format specified in ISO/IEC 23008-12, to correspond with a registration in the Internet Assigned Numbers Authority (IANA) central registry.

The file extension and media type of a file in this family usually reflect the major brand in the `FileTypeBox`. When the major brand indicates a brand related to 7.3, the media type defined here should be used. When such a brand is a compatible brand, this media type may also be used.

7.5.2 Registration

```
Media type name: image

Subtype name: hsj2

Required parameters: None

Optional parameters: Same as for the media type image/heif. The presence of a
sample entry of type 'mjp2' is signalled by including a value whose first
element is 'mjp2'in the codecs parameter.

Encoding considerations: binary

Security considerations: See media type image/heif. In addition, sample
entries of type 'mjp2' contain structures of variable length and have an
extensible syntax. Both aspects present potential security risks for
implementations. In particular, variable length structures present buffer
overflow risks and extensible syntax could result in the triggering of
adverse actions.

Interoperability considerations: Same as for the media type image/heif. In
addition, sample entries of type 'mjp2' can conform to one of several
profiles and/or require one of several capabilities, e.g. as specified in
Rec. ITU T.800 | ISO/IEC 15444-1 – not all of which are necessarily supported
by a receiving decoder. As a result, decoders might attempt to process the
contents only to determine that they cannot be rendered either partially or
in full.

Published specification: Rec. ITU-T T.815 | ISO/IEC 15444-16

Applications: Multimedia and scientific

Fragment identifier considerations: Same as for the media type image/heif

Restrictions on usage: None

Additional information:

    Deprecated alias names for this type: N/A

        Magic number(s): None
```

        File extension(s): hsj2

        Macintosh File Type Code(s): N/A

Intended usage: COMMON

Contact name: ISO/IEC JTC 1/SC 29/WG 1 Convenor

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Author/Change controller: ITU-T & ISO/IEC JTC 1

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– Recommendation ITU-T T.804 (2015) | ISO/IEC 15444-5:2015, *Information technology – JPEG 2000 image coding system – Reference software*.

– IETF RFC 3745, *MIME Type Registrations for JPEG 2000 (ISO/IEC 15444)*.

– IETF RFC 6838 (BCP 13), *Media Type Specifications and Registration Procedures*.

– ISO/IEC 14496-12, *Information technology – Coding of audio-visual objects – ISO base media file format*.

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