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Information technology — JPEG 2000 image coding system —

Part 2: **Extensions**

Technologies de l'information — Système de codage d'images JPEG 2000 —

Partie 2: Extensions

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Foreword

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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 ITU-T (as ITU-T REC. T.803) 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 second edition cancels and replaces the first edition (ISO/IEC 15444-2:2004), which has been technically revised. It also incorporates the Amendments ISO/IEC 15444-2:2004/Amd 2:2006, ISO/IEC 15444-2:2004/Amd 3:2015 and ISO/IEC 15444-2:2004/Amd 4:2015 and the Technical Corrigenda ISO/IEC 15444-2:2004/Cor 3:2005 and ISO/IEC 15444-2:2004/Cor 4:2007.

The main changes are as follows:

— Annex N ("JPX file format extended metadata definition and syntax") is deprecated;

— the Registration Authority specified in M.7, which was never created or used, is cancelled;

— signalling for HTJ2K codestreams, as specified in Rec. ITU-T T.814 | ISO/IEC 15444-15, is added;

— the RLT marker segment is added;

— references have been revised to their currently in-force editions;

— signalling for codestreams that conform to ISO/IEC 21122-1 is added;

— parameterized colourspace is added to the Colour Specification box;

— outstanding amendments and corrigenda are consolidated; and

— the definition of the CAP marker segment was moved to Rec. ITU-T T.800 (2019) | ISO/IEC 15444-1:2019.

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

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 and www.iec.ch/national-committees.

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This Recommendation | International Standard:

- specifies extended decoding processes for converting compressed image data to reconstructed image data;
- specifies an extended codestream syntax containing information for interpreting the compressed image data;
- specifies an extended file format;
- specifies a container to store image metadata;
- defines a standard set of image metadata;
- provides guidance on extended encoding processes for converting source image data to compressed image data;
- provides guidance on how to implement these processes in practice.

INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

Information technology – JPEG 2000 image coding system – Extensions

1 Scope

This Recommendation | International Standard defines a set of lossless (bit-preserving) and lossy compression methods for coding continuous-tone, bi-level, grey-scale, colour digital still images, or multi-component images.

This Recommendation | International Standard:

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- provides guidance on how to implement these processes in practice.

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 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.81 (1992) | ISO/IEC 10918-1:1994, *Information technology – Digital compression and coding of continuous-tone still images: Requirements and guidelines.*
- Recommendation ITU-T T.82 (1993) | ISO/IEC 11544:1993, *Information technology – Coded representation of picture and audio information – Progressive bi-level image compression.*
- Recommendation ITU-T T.84 (1996) | ISO/IEC 10918-3:1997, *Information technology – Digital compression and coding of continuous-tone still images: Extensions.*, including Rec. ITU-T T.84 (1996)/Amd.1 (1999) | ISO/IEC 10918-3:1997/Amd.1:1999, *Information technology – Digital compression and coding of continuous-tone still images: Extensions – Amendment 1: Provisions to allow registration of new compression types and versions in the SPIFF header.*
- Recommendation ITU-T T.800 (2019) | ISO/IEC 15444-1:2019, *Information technology – JPEG 2000 image coding system: Core coding system.*
- Recommendation ITU-T T.805 | ISO/IEC 15444-6, *Information technology – JPEG 2000 image coding system – Part 6: Compound image file format*.
- Recommendation ITU-T T.814 (2019) | ISO/IEC 15444-15:2019, *Information technology – JPEG 2000 image coding system: High-throughput JPEG 2000.*
- Recommendation ITU-T T.832 (2019) | ISO/IEC 29199-2:2020, *Information technology – JPEG XR image coding system – Image coding specification*.

2.2 Paired Recommendations | International Standards

- Recommendation ITU-T H.273 (in force), *Coding-independent code points for video signal type identification*.

– ISO/IEC 23001-8: (in force), *Information technology – MPEG systems technologies – Part 8: Coding-independent code points*.

2.3 Additional references

– Recommendation ITU-T T.42 (2003), *Continuous-tone colour representation method for facsimile.*

– Recommendation ITU-T T.45 (2000), *Run-length Colour Encoding*.

– IEC 61966-2-1:1999, *Multimedia systems and equipment – Colour measurement and management: Part 2-1: Colour management – Default RGB colour space – sRGB, plus its Amendment 1: 2003.*

– IEC 61966-2-2:2003, *Multimedia systems and equipment – Colour measurement and management – Part 2-2: Colour management – Extended RGB colourspace – scRGB.*

– IETF RFC 1321 (1992), *The MD5 Message-Digest Algorithm.*

– IETF RFC 2630 (1999), *Cryptographic Message Syntax.*

– ISO 3166-1:2020, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes.*

– ISO 3166-2:2020, *Codes for the representation of names of countries and their subdivisions – Part 2: Country subdivision code.*

– ISO 10126-2:1991, *Banking – Procedures for message encipherment (wholesale) – Part 2: DEA algorithm.*

– ISO 22028-2:2013, *Photography and graphic technology — Extended colour encodings for digital image storage, manipulation and interchange — Part 2: Reference output medium metric RGB colour image encoding (ROMM RGB).*– ISO/IEC 10126-2:2010, *Image technology colour management – Architecture, profile format and data structure – Part 1: Based on ICC.1:2010*.

– ISO/IEC 15938 (all parts), *MPEG-7.*

– ISO/IEC 21122-1:2019, *Information technology – JPEG XS low-latency lightweight image coding system – Part 1: Core coding system*.

– ISO/IEC 60559:2020, *Information technology — Microprocessor Systems — Floating-Point arithmetic.*

– ANSI X9.30.2:1997, *Public Key Cryptography for the Financial Services Industry – Part 2: The Secure Hash Algorithm (SHA-1).*
http://www.itl.nist.gov/fipspubs/fip180-1.htm

– Federal Information Processing Standard Publication (FIPS PUB) 186-4 (2013), *Digital Signature Standard (DSS).*
https://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.186-4.pdf

– PIMA 7667:2001. *Photography-Electronics still picture imaging-Extended sRGB color encoding e-sRGB.*
https://www.imaging.org/site/IST/Standards/IST/Standards/TC42.aspx?hkey=487699a5-8464-4f17-8eac-fadecd3ed20c

– W3C Recommendation. *Extensible Markup Language (XML 1.0)*, fifth edition (26 November 2008). https://www.w3.org/TR/xml/

– W3C Recommendation. *Namespaces in XML*, (14 January 1999). https://www.w3.org/TR/1999/REC-xml-names-19990114/

– W3C Recommendation, *XML Schema Part 1: Structures* second edition (28 October 2004). https://www.w3.org/TR/xmlschema-1/

– W3C Recommendation. *XML Schema Part 2: Datatypes* second edition (28 October 2004). https://www.w3.org/TR/xmlschema-2/

3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply. The definitions defined in Rec. ITU-T T.800 | ISO/IEC 15444-1, Clause 3 also apply to this Recommendation | International Standard, except for the terms decomposition level, sub-band and resolution, which are redefined in this clause.

3.1 **attribute**: XML construct that is a name-value pair extending or qualifying the meaning of an element.

3.2 **cell**: Optional subdivision of a tile used for low-memory encoding and decoding.

