
**Information technology — JPEG XR
image coding system —**

**Part 3:
Motion JPEG XR**

*Technologies de l'information — Système de codage d'image
JPEG XR —*

Partie 3: Motion JPEG XR

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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ISO/IEC 29199-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This part of ISO/IEC 29199 is technically aligned with ITU-T T. JXR-3 [*Information to be supplied by ITU TSB for publication*] but is not published as identical text.

ISO/IEC 29199 consists of the following parts, under the general title *Information technology — JPEG XR image coding system*:

- *Part 1: System architecture* [Technical Report]
- *Part 2: Image coding specification*
- *Part 3: Motion JPEG XR*
- *Part 4: Conformance testing*
- *Part 5: Reference software*

Introduction

This part of ISO/IEC 29199 is the Motion JPEG XR specification, based on the ISO base media file format.

This part of ISO/IEC 29199 specifies the use of JPEG XR coding for timed sequences of images. The Motion JPEG XR file format is designed to contain one or more motion sequences of JPEG XR images, with their timing. It is intended as a 'building block', specifying only the video format. An application would be expected to combine Motion JPEG XR with suitable audio, metadata, etc. for a complete application specification; that specification would normally select profiles and levels of Motion JPEG XR, and could also specify application profiles and levels that apply to the integration.

Motion JPEG XR is expected to be used in a variety of applications, particularly where JPEG XR coding technology is already available for other reasons, or where the high-quality frame-based approach, with no inter-frame coding, is appropriate. These application areas include

- digital still cameras,
- error-prone environments such as wireless and the internet,
- video capture,
- high-quality digital video recording for professional broadcasting and motion picture production from film-based to digital systems, and
- high-resolution medical and satellite imaging.

Motion JPEG XR is a flexible format, permitting a wide variety of usages, such as editing, display, interchange, and streaming.

Information technology — JPEG XR image coding system —

Part 3: Motion JPEG XR

1 Scope

This part of ISO/IEC 29199 specifies the use of JPEG XR coding for timed sequences of images (motion sequences) within files based on the ISO base media file format (ISO/IEC 15444-12).

2 Normative references

The following referenced documents are indispensable for the application 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 15076-1:—¹⁾, *Image technology colour management — Architecture, profile format and data structure — Part 1: Based on ICC.1:2004-10*

ISO/IEC 15444-12, *Information technology — JPEG 2000 image coding system — Part 12: ISO base media file format*

NOTE ISO/IEC 15444-12 is technically identical to ISO/IEC 14496-12.

ITU-T T.832 (2009-03)|ISO/IEC 29199-2:2009, *Information technology — JPEG XR image coding system — Part 2: Image coding specification*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

motion sequence

timed sequence of JPEG XR images

4 Compatibility and technology derivation

4.1 Family members

This is a 'building block' specification; it defines how to store Motion JPEG XR sequences in a file format based on the ISO base media file format. It stands as a member of a family of specifications with common formatting.

1) To be published. Technical revision of ISO 15076-1:2005.

Since this is a building block specification, if audio is needed, then suitable audio support should be selected from other specifications using the ISO base media file format, or from the MP4 registration authority (as defined in ISO/IEC 15444-12).

The other family members include the ISO base media file format (ISO/IEC 15444-12) and file formats based on it.

These specifications share a common definition for the structure of a file (a sequence of objects, called boxes here, and atoms in other similar file formats), and a common definition of the general structure of an object (the size and type).

All these specifications require that readers ignore objects that are unrecognizable to them.

This part of ISO/IEC 29199 takes precedence over those on which it is based, in any case where there are differences or conflicts; however no such conflicts are known to exist.

4.2 Conformance

Except as otherwise specified herein (if any such differences exist), files conforming to this part of ISO/IEC 29199 shall conform to the file format specified in ISO/IEC 15444-12.

Implementations of Motion JPEG XR decoders shall support the decoding of video tracks using the JPEG XR coding technology (as specified in ITU-T T.832|ISO/IEC 29199-2) in files conforming to this part of ISO/IEC 29199.

Files conforming to this specification shall contain at least one Motion JPEG XR video track.

4.3 Profiles and levels

The conformance to these restricted profiles is indicated in the file type box by the addition of the compatible profiles as brands within the compatibility list. Annex A defines the available profiles in this part of ISO/IEC 29199. Derived and application specifications based on this specification may define additional brands.

5 Motion sequences

5.1 Sample Entry and sample formats

5.1.1 Definition

Box Types: 'mjxr'
Container: Sample Table Box ('stbl')
Mandatory: Yes
Quantity: Exactly one

The format of a sample when the sample entry name is 'mjxr' is a CODED_IMAGE() as defined in ISO/IEC 29122-2, *without* the IMAGE_HEADER(). Each image presented to a JPEG XR decoder is logically formed by appending the content of each sample to the content of the JPEG XR Header Box in its associated Visual Sample Entry.

NOTE Offset values in the coded image apply to this complete set of data that is supplied to the decoder, i.e. the result of the append of the JPEG XR Header Box and the sample data.

All images in the sequence obey the constraints of the profile and level indicators in the JPEG XR Profile Box, if present; if no specific profile is indicated, then the Advanced Profile of ITU-T T.832|ISO/IEC 29199-2 shall be inferred.

The values present in the VisualSampleEntry, its constituent boxes including the JPEG XR Header Box, and the codestreams that these boxes describe, must agree, to the extent that the format and precision of fields allow. This agreement includes, but is not limited to, width and height information, and the resolution declaration (within the accuracy permitted by the different representations). Files with conflicts are non-conforming and readers may attempt to decide which values are correct, or reject the file.

The fields `horizresolution` and `vertresolution` in the Visual Sample Entry indicate the highest resolution component of the image (which is typically, but not required to be, the luminance, in an image in which not all components have the same spatial sampling density).

If the coded images contain an alpha plane, a suitable value of 'depth' as indicated in the Visual Sample Entry, shall be used.

NOTE Only one CODED_IMAGE() is supported per 'mjxr' sample entry. Hence, the concept of a 'separate alpha image plane' as specified in Annex A of ITU-T T.832 (2009-03) | ISO/IEC 29199-2:2009 is not supported here.

Colour information may be supplied in one or more ColourInformationBoxes. These should be placed in order in the sample entry starting with the most accurate (and potentially the most expensive to process), in progression to the least. These are advisory and concern rendering and colour conversion, and there is no normative behaviour associated with them; a reader may choose to use the most suitable. A ColourInformationBox with an unknown colour type may be ignored. Values of the field `colour_type` other than those documented here are reserved.

NOTE The ColourInformationBox is specific to the VideoSampleEntry and should not be confused with the 'colr' box defined in other standards such as the JPX File Format (ITU-T T.801 | ISO/IEC 15444-2), which can be discriminated both by context and by the initial bytes of the box.

The ICC profile chosen may be a restricted one, under the code 'rICC', which permits simpler processing. Such a restricted profile shall be of either the Monochrome or Three-Component Matrix-Based class of input profiles, as defined by ISO 15076-1. If the profile is of another class, then the 'prof' indicator must be used.

NOTE If there were a need for two images in each file-format sample, for example for support of interlaced coding or separate alpha coding, a different Visual Sample Entry name would be used.

5.1.2 Syntax

```
// Visual Sequences
class MJXRSampleEntry() extends VisualSampleEntry ('mjxr'){
    JPEGXRInfoBox();
    JPEGXRHeaderBox();
    JPEGXRProfileBox();           // optional
    ColourInformationBox();       // optional
}

class JPEGXRInfoBox() extends FullBox('jxri', 0, version=0){
    UInt8[16] PIXEL_FORMAT;
    UInt8     IMAGE_BAND_PRESENCE;
    UInt8     ALPHA_BAND_PRESENCE;
}

class JPEGXRHeaderBox() extends FullBox('jxrh', 0, version=0){
    IMAGE_HEADER();
    IsCurrPlaneAlphaFlag := FALSE;
    IMAGE_PLANE_HEADER();
    if (ALPHA_IMAGE_PLANE_FLAG) {
        IsCurrPlaneAlphaFlag := TRUE;
        IMAGE_PLANE_HEADER();
    }
}
```

```
class JPEGXRProfileBox() extends Box('jxrp'){
    PROFILE_LEVEL_INFO();
}

class ColourInformationBox extends Box('colr'){
    unsigned int(32) colour_type;
    if (colour_type == 'nclx') /* on-screen colours */
    {
        unsigned int(16) colour_primaries;
        unsigned int(16) transfer_characteristics;
        unsigned int(16) matrix_coefficients;
        unsigned int(1) full_range_flag;
        unsigned int(7) reserved = 0;
    }
    else if (colour_type == 'rICC')
    {
        ICC_profile; // restricted ICC profile
    }
    else if (colour_type == 'prof')
    {
        ICC_profile; // unrestricted ICC profile
    }
}
```

5.1.3 Semantics

In the Visual Sample Entry:

Compressorname the value "\016Motion JPEG XR" is suggested but not required (\016 is 14, the length of the string in bytes)
depth takes one of the following values; other values are reserved, and if found, the composition behaviour is undefined
0x18 – images are in colour with no alpha
0x28 – images are in grayscale with no alpha
0x20 – images have alpha (gray or colour)

In the JPEG XR Header Box:

IMAGE_HEADER() as defined in 8.3 of ITU-T T.832 (2009-03) | ISO/IEC 29199-2:2009
IMAGE_PLANE_HEADER() as defined in 8.4 of ITU-T T.832 (2009-03) | ISO/IEC 29199-2:2009
IsCurrPlaneAlphaFlag is not a field in this structure, but a local variable used in the decoding of the IMAGE_PLANE_HEADER();
ALPHA_IMAGE_PLANE_FLAG is not a field in this structure, but a field in the IMAGE_HEADER() which is tested here
PIXEL_FORMAT as defined in A.7.19 of ITU-T T.832 (2009-03) | ISO/IEC 29199-2:2009
IMAGE_BAND_PRESENCE as defined in A.7.31 of ITU-T T.832 (2009-03) | ISO/IEC 29199-2:2009
ALPHA_BAND_PRESENCE as defined in A.7.32 of ITU-T T.832 (2009-03) | ISO/IEC 29199-2:2009

In the JPEG XR Profile Box:

PROFILE_LEVEL_INFO() as defined in 8.6 of ITU-T T.832 (2009-03) | ISO/IEC 29199-2:2009

In the Colour Information Box:

for colour_type 'nclx': these fields are exactly the four bytes defined for PTM_COLOR_INFO() in A.7.2 of ITU-T T.832 (2009-03) | ISO/IEC 29199-2:2009
ICC_profile: an ICC profile as defined, e.g., in ISO 15076-1 or ICC.1:2001-04 is supplied.

Annex A (normative)

File and codestream profiles

A.1 Profile Introduction

This Annex normatively specifies the Motion JPEG XR profiles. The brand of the Motion JPEG XR Advanced profile shall be in the `compatible_brands` field of the `filetype` box ('ftyp') in files conforming to this specification.

A.2 Motion JPEG XR Advanced profile

File conforming to the Motion JPEG XR Advanced profile have the following characteristics:

- 1) At least one video track is present, using at least one `MJXRSampleEntry`.
- 2) All images conform to the Advanced profile of the ITU-T T.832|ISO/IEC 29199-2 JPEG XR image coding specification.

NOTE The Motion JPEG XR Advanced Profile is a 'catch all' that permits any features of initial edition of the JPEG XR image coding specification and the ISO base media file format.

A.3 Motion JPEG XR Sub-Baseline Profile

File conforming to the Motion JPEG XR Sub-Baseline profile have the following characteristics:

- 1) All images conform to the Sub-Baseline profile of the ITU-T T.832|ISO/IEC 29199-2 JPEG XR image coding specification.
- 2) Each track shall have exactly one sample description, used by all samples.
- 3) The file is self-contained; no data references are used, and therefore all media data is contained within the single file.
- 4) The media data in the Media Data Box(es) is placed within the box(es) in temporal order.
- 5) If more than one track is present, the media data for the tracks is interleaved, with a granularity no greater than the greater of (a) the duration of a single 'sample' (in file format terms) or (b) one second.

The profile indicators for these profiles are as follows. Since this is a building block specification, these would not normally be used as the `major_brand`; however, if one of these is the `major_brand`, the `minor_version` must be zero.

Advanced Profile	<code>mjxr</code>
Sub-Baseline Profile	<code>mjxs</code>

Bibliography

- [1] ICC.1:2001-04, *File format for color profiles*, International Color Consortium
- [2] ITU-T T.801|ISO/IEC 15444-2, *Information technology — JPEG 2000 image coding system — Extensions*

