

First edition  
2011-07-15

---

---

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

**Part 1:  
System architecture**

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

*Partie 1: Architecture du système*

---

---

Reference number  
ISO/IEC TR 29199-1:2011(E)





**COPYRIGHT PROTECTED DOCUMENT**

© ISO/IEC 2011

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

Foreword.....	v
1 Scope .....	1
2 Terms and definitions.....	1
3 Abbreviations .....	6
4 The JPEG XR image coding system.....	7
5 General overview of technical design.....	7
5.1 Basic technology structure .....	7
5.2 Supported image format types.....	8
5.3 Decoded image structure and interpretation.....	9
5.4 Data processing hierarchy and structures .....	10
5.5 The JPEG XR transform structure and hierarchy .....	11
5.6 Handling of image and tile boundaries .....	13
5.7 Quantization and lossless representation.....	13
5.7.1 Overall quantization design concepts.....	13
5.7.2 Quantization control on a spatial region basis .....	14
5.7.3 Quantization control on a frequency band basis.....	14
5.7.4 Quantization control on a colour plane component basis .....	14
5.7.5 Quantization control type combinations.....	14
5.8 Prediction of transform coefficients and coded block patterns .....	14
5.9 Adaptive ordering of coefficient scanning pattern.....	15
5.10 Entropy coding of transform coefficients .....	15
5.11 Codestream structure .....	16
6 JPEG XR design in relation to baseline JPEG and JPEG 2000 .....	17
6.1 General .....	17
6.2 Image area partitions.....	18
6.3 Image fidelity refinement .....	18
7 High dynamic range (HDR) image coding.....	18
7.1 HDR formats supported in JPEG XR.....	18
7.2 HDR signal processing design in JPEG XR.....	19
7.3 Examples of HDR applications for JPEG XR.....	19
8 JPEG XR profiles and levels.....	19
8.1 Overview of profiles and levels .....	19
8.2 Sub-Baseline profile.....	20
8.3 Baseline profile.....	20
8.4 Main profile.....	20
8.5 Advanced profile.....	20
8.6 Levels .....	21
9 JPEG XR encoding practices.....	21
9.1 General encoding guidelines .....	21
9.2 Encoding for random access .....	21
9.3 Guidelines for tile size selection .....	22
10 The JPEG XR decoding process functionality .....	23
10.1 JPEG XR decoding process structure.....	23
10.2 Output colour conversion.....	24
10.3 Resolution scalability at decoder .....	24
10.3.1 General .....	24
10.3.2 DC-only image decoding .....	24

10.3.3 DC plus LP image decoding .....24

10.4 Quality scalability at decoder .....25

10.5 Spatial random access at decoder .....25

11 JPEG XR codestream compressed-domain manipulation.....25

11.1 General.....25

11.2 Flexbits trimming .....26

11.3 Flexbits and HP band elimination .....26

11.4 Flexbits and HP and LP band elimination .....26

11.5 Spatial versus frequency codestream mode switching .....26

11.6 Rotation and flip.....26

11.7 Compressed-domain region of interest extraction.....26

11.8 Switching between interleaved and planar alpha planes .....27

11.9 Compressed-domain retiling .....27

## 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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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.

In exceptional circumstances, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard (“state of the art”, for example), it may decide to publish a Technical Report. A Technical Report is entirely informative in nature and shall be subject to review every five years in the same manner as an International Standard.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

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

ISO/IEC TR 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*

# Information technology — JPEG XR image coding system —

## Part 1: System architecture

### 1 Scope

This document is a non-normative Supplement | Technical Report providing a technical overview and encoding and decoding practice guidelines for the JPEG XR image coding system as normatively specified in ITU-T Rec. T.832 | ISO/IEC 29199-2, ITU-T Rec. T.833 | ISO/IEC 29199-3, ITU-T Rec. T.834 | ISO/IEC 29199-4, and ITU-T Rec. T.835 | ISO/IEC 29199-5.