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Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 2:
High efficiency video coding

AMENDMENT 3: Additional supplemental enhancement information

Technologies de l'information — Codage à haute efficacité et livraison des medias dans des environnements hétérogènes —

Partie 2: Codage vidéo à haute efficacité

AMENDEMENT 3: Informations additionnelles supplémentaires pour amélioration

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This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*, in collaboration with ITU-T. The identical text for ISO/IEC 23008-2 is published as ITU-T H.265.

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General

Throughout the specification, replace all single-word instances of "nested" with "scalable-nested" (e.g., there is no single-word instance of "nested" in "non-nested"), and all instances of "non-nested" with "non-scalable-nested", except in 3.158 (which is kept unchanged) and Table F.4 in F.14.3.1 (for which a change is provided below).

Clause 3

Add the following term definitions (in alphabetical order within the current list) and correct all term numbering sequentially:

3.X
azimuth circle
circle on a sphere connecting all points with the same azimuth value

Note 1 to entry: An azimuth circle is always a *great circle* like a longitude line on the earth.

3.X
constituent picture
part of a spatially frame-packed stereoscopic video picture that corresponds to one view, or a picture itself when frame packing is not in use or the temporal interleaving frame packing arrangement is in use

3.X
elevation circle
circle on a sphere connecting all points with the same elevation value

Note 1 to entry: An elevation circle is similar to a lattitude line on the earth. Except when the elevation value is zero, an elevation circle is not a *great circle* like a longitude circle on the earth.

3.X
global coordinate axes
coordinate axes associated with *omnidirectional video* that are associated with an externally reference-able position and orientation

Note 1 to entry: The global coordinate axes may correspond to the position and orientation of a device or rig used for omnidirectional audio/video acquisition as well as the position of an observer's head in the three-dimensional space of the *omnidirectional video* rendering environment.

3.X
great circle
intersection of a sphere and a plane that passes through the centre point of the sphere

Note 1 to entry: A great circle is also known as an orthodrome or Riemannian circle.

3.X
local coordinate axes
coordinate axes having a specified rotation relationship relative to the *global coordinate axes*

3.X
omnidirectional video
video content in a format that enables rendering according to the user's viewing orientation, e.g., if viewed using a head-mounted device, or according to a user's desired *viewport*, reflecting a potentially rotated viewing position

3.X
packed region
region in a *region-wise packed picture* that is mapped to a *projected region* according to a *region-wise packing*

3.X
projected picture
picture that uses a *projection* format for *omnidirectional video*

3.X
projected region
region in a *projected picture* that is mapped to a *packed region* according to a *region-wise packing*

3.X
projection
specified correspondence between the colour samples of a *projected picture* and azimuth and elevation positions on a sphere

3.X
region-wise packed picture
decoded picture that contains one or more *packed regions*

Note 1 to entry: A packed picture may contain a *region-wise packing* of a *projected picture*.

3.X
region-wise packing
transformation, resizing, and relocation of *packed regions* of a *region-wise packed picture* to remap the *packed regions* to *projected region*s of a *projected picture*

3.X
sphere coordinates
azimuth and elevation angles identifying a location of a point on a sphere

3.X
sphere region
region on a sphere, specified either by four *great circles* or by two *azimuth circles* and two *elevation circles*, or such a region on a rotated sphere after applying yaw, pitch, and roll rotations

3.X
tilt angle
angle indicating the amount of tilt of a *sphere region*, measured as the amount of rotation of a *sphere region* along the axis originating from the sphere origin passing through the centre point of the *sphere region*, where the angle value increases clockwise when looking from the origin towards the positive end of the axis

3.X
viewport
region of *omnidirectional video* content suitable for display and viewing by the user

Clause 4

Add the following to the list of abbreviations (in alphabetical order):

MCTS   motion-constrained tile set

5.8

Add the following function definitions:

Asin(x)   the trigonometric inverse sine function, operating on an argument x that is in the range of −1.0 to 1.0, inclusive, with an output value in the range of −π ÷ 2 to π ÷ 2, inclusive, in units of radians   (5-2)

Atan(x)   the trigonometric inverse tangent function, operating on an argument x, with an output value in the range of −π ÷ 2 to π ÷ 2, inclusive, in units of radians   (5-3)

$$\text{Atan2}(y,x)=\begin{cases} \text{Atan}\left(\dfrac{y}{x}\right) & ;\ \text{if } x > 0 \\[4pt] \text{Atan}\left(\dfrac{y}{x}\right)+\pi & ;\ \text{if } x < 0 \ \&\&\ y >= 0 \\[4pt] \text{Atan}\left(\dfrac{y}{x}\right)-\pi & ;\ \text{if } x < 0 \ \&\&\ y < 0 \\[4pt] +\dfrac{\pi}{2} & ;\ \text{if } x == 0 \ \&\&\ y >= 0 \\[4pt] -\dfrac{\pi}{2} & ;\ \text{otherwise} \end{cases}$$ (5-4)

Renumber the prior Formulae 5-2 through 5-15 as 5-5 to 5-18 to account for the added formulae.

Add the following function definition:

Sin(x)   the trigonometric sine function operating on an argument x in units of radians   (5-19)

Renumber the prior Formulae 5-19 through 5-20 as 5-20 to 5-21 to account for the added formulae.

Add the following function definition:

Tan(x)   the trigonometric tangent function operating on an argument x in units of radians   (5-22)

7.4.2.4.4, NOTE 2

Delete the sentence that says "Consequently, hypothetical reference decoder (HRD) parameters carried in non-nested buffering period, picture timing and decoding unit information SEI messages apply to access units based on such access unit boundary detection."

7.4.4

Replace paragraph 6 (directly after NOTE 1) and NOTE 2 with the following:

general_non_packed_constraint_flag equal to 1 specifies that there are no frame packing arrangement SEI messages, segmented rectangular frame packing arrangement SEI messages, omnidirectional projection indication SEI messages, or cubemap projection SEI messages present in the CVS. general_non_packed_constraint_flag equal to 0 indicates that there may or may not be one or more frame packing arrangement SEI messages, segmented rectangular frame packing arrangement