

International **Standard**

ISO/IEC 23090-6

Information technology — Coded representation of immersive media —

Part 6:

AMENDMENT 1: Immersive mediametrics for V3C Data and OMAR MAI.

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Information technology — Coded representation of immersive media -

Part 6:

AMENDMENT 1: Immersive media metrics for V3C Data and OMAF

Normative references
Add the following reference:

ISO/IEC 22000 10 - 5

ISO/IEC 23090-10, Coded representation of immersive media — Part 10: Carriage of visual volumetric videobased coding data

Terms and definitions

Replace the first sentence with: "For the purposes of this document, the terms and definitions given in ISO/IEC 23090-10 apply."

Clause 4

Add the following abbreviated terms:

3DoF Three Degrees of Freedom

6DoF

V3C Visual Volumetric Video-based Coding (ISO/IEC 23090-10)

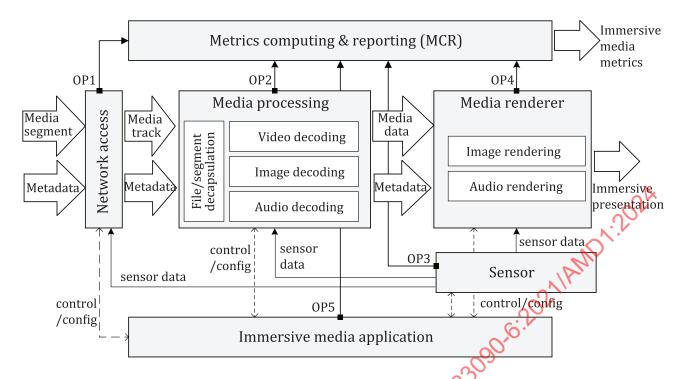
6.1, first paragrap

Replace the third sentence with the following:

AVR client may be an OMAF player or a V3C content player for file/segment reception or file access, file/ segment decapsulation, decoding of audio, video, or image bitstreams, audio and image rendering, and viewport selection.

Figure 1

Update the figure to add missing text as follows:



int of Isolfe with the full PDF of Isolfe Figure 1 — Immersive media metrics client reference model

6.2.3

Add the following bullets before the last bullet:

- MIV metadata, for example:
 - viewport camera information;
 - viewport position information;
 - viewing space information
- V-PCC metadata, for example:
 - volumetric annotation information;
 - scene object information;

6.2.4

Add the following bullet at the end:

Location information (i.e., x-y-z coordinates) corresponding to the current viewport

7.1

Delete Table 1 and replace the second paragraph with the following:

Two new data types are defined: ViewportDataType and ViewpointDataType. ViewportDataType is an object that defines a viewport and is defined as shown in Table 1, while ViewpointDataType is an object that defines a viewpoint and is defined as shown in Table 2.

Table 1 — ViewportDataType

Key	Туре	Description
ViweportDataType	Object	
media_type	Integer	Specifies the type of the immersive media: 0 indicates omnidirectional media, 1 indicates V3C media, and other values are reserved.
viewport_omnidirectional	OmnidirectionViweportDataType	Specifies the viewport as an omnidirectional viewport. Shall only be present if the media_type is equal to 0.
viewport_v3c	V3CViewportDataType	Specifies the view- port as a V3C view- port. Shall only be present if the media_type is equal to 1.

Table 2 — ViewpointDataType

Key	Туре	Description
ViewpointDataType	Object	
media_type	Integer	Specifies the type of the immersive media: 0 indicates omnidirectional, 1 indicates V3C, and other values are reserved.
viewpoint_omnidirectional	OmnidirectionViewpointDataType	Specifies the view-point as an omnidi- rectional viewpoint. Shall only be pres- ent if media_type is equal to 0.
viewpoint_v3c.O	V3CViewpointDataType	Specifies the view-point as a V3C view-point. Shall only be present if media_type is equal to 1.

For omnidirectional media, OmnidirectionalViewportDataType and OmnidirectionalViewpointDataType are defined as shown in Table 3 and Table 4, respectively.

Table 3 — OmnidirectionalViewportDataType

Key	Туре	Description
OmnidirectionalViewportDataType	Object	
viewpoint_id	Integer	Specifies the identifier of the viewpoint to which the viewport belongs. Each viewpoint has a unique viewpoint_id.
centre_azimuth	Integer	Specifies the azimuth of the centre of the viewport in units of 2^{-16} degrees. The value shall be in the range of $-180 * 2^{16}$ to $180 * 2^{16} - 1$, inclusive.
centre_elevation	Integer	Specifies the elevation of the centre of the view-port in units of 2^{-16} degrees. The value shall be in the range of $-90 * 2^{16}$ to $90 * 2^{16}$, inclusive.
centre_tilt	Integer	Specifies the tilt angle of the viewport in units of 2^{-16} degrees. The value shall be in the range of $-180 * 2^{16}$ to $180 * 2^{16} - 1$, inclusive.
azimuth_range	Integer	Specifies the azimuth range of the viewport through the centre point of the viewport, in units of 2 ⁻¹⁶ degrees.
elevation_range	Integer	Specifies the elevation range of the viewport through the centre point of the viewport, in units of 2 degrees.

Table 4 — OmnidirectionalViewpointDataType

Key	Type C	Description
OmnidirectionalViwepointDataType	Object	
viewpoint_id	Integer	Specifies an identifier for the viewpoint. Each viewpoint has a unique viewpoint_id.
centre_azimuth	Integer	Specifies the azimuth of the centre of the viewport in units of 2^{-16} degrees. The value shall be in the range of $-180 * 2^{16}$ to $180 * 2^{16} - 1$, inclusive.
centre_elevation	Integer	Specifies the elevation of the centre of the viewport in units of 2^{-16} degrees. The value shall be in the range of $-90 * 2^{16}$ to $90 * 2^{16}$, inclusive.
centre_tilt	Integer	Specifies the tilt angle of the viewport in units of 2^{-16} degrees. The value shall be in the range of $-180 * 2^{16}$ to $180 * 2^{16}$ – 1, inclusive.
For V3C media, V3CViewportDataType and V3CView Table 6, respectively	wpointDataTyp	pe are defined as shown in Table 5 and

 $Table \ 5 - V3CViewportDataType$

Key	Туре	Description
V3CViewportDataType	Object	
viewpoint	V3CViewpointDataType	Specifies the viewpoint to which the viewport belongs. Note that each viewpoint has a unique viewpoint_id.
camera_type	Integer	Specifies the projection method of the viewport camera. The value 0 specifies ERP projection. The value 1 specifies a perspective projection. The value 2 specifies an orthographic projection. Values in the range 3 to 255 are reserved for future use by ISO/IEC.
erp_horizontal_fov	SignedInt	Specifies the longitude range for an ERP projection corresponding to the horizontal size of the viewport region, in units of radians. The value shall be in the range 0 to 2π . This is for camera_type = 0.
erp_vertical_fov	SignedInt Of SOURCE	Specifies the latitude range for an ERP projection corresponding to the vertical size of the viewport region, in units of radians. The value shall be in the range 0 to π . This is for camera_type = 0.
perspective_horizontal_fov	SignedInt	Specifies the horizontal field of view for perspective projection in radians. The value of shall be in the range of 0 and π . This is for camera_type = 1.
perspective_aspect_ratio	Float	Specifies the relative aspect ratio of viewport for perspective projection (horizontal/vertical). The value shall be expressed in 32-bit binary floating-point format with the 4 bytes in big-endian order and with the parsing process as specified in IEEE 754. This is for camera_type = 1.
ortho_aspect_ratio	Float	Specifies the relative aspect ratio of viewport for orthogonal projection (horizontal/vertical). The value shall be expressed in 32-bit binary floating-point format with the 4 bytes in big-endian order and with the parsing process as specified in IEEE 754. This is for camera_type = 2.

Table 5 (continued)

Key	Туре	Description
ortho_horizontal_size	Float	Specifies the horizontal size of the orthogonal in metres.
		The value shall be expressed in 32-bit binary floating-point format with the 4 bytes in big-endian order and with the parsing process as specified in IEEE 754.
		This is for camera_type ≥ 2.
clipping_near_plane	Float	Specifies the near depth (or distance) based on the near clipping plane of the viewport in metres. The value shall be expressed in 32-bit binary floating-point format with the 4 bytes in big endian order and with the parsing process as specified in IEEE 754.
clipping_far_plane	Float	Specifies the far depth (or distance) based on the far clipping plane of the viewport in metres. The value shall be expressed in 32-bit binary floating-point format with the 4 bytes in big-endian order and with the parsing process as specified in IEEE 754.

Table 6 — V3CViewpointDataType

Key	Туре	Description
V3CViewpointDataType	Object	
viewpoint_id	string	Specifies the identifier of the viewpoint for V3C content.
Ab_bos_x	SignedInt	Indicates the x-coordinate of the position of the view-point in meters in the global reference coordinate system, as defined in ISO/IEC 23090-10:2022, subclause 10.2.1.2. The values shall be expressed in 32-bit binary floating point format with the 4 bytes in big-endian order and with the parsing process as specified in IEEE 754.
vp_pos_yM.	SignedInt	Indicates the y-coordinate of the position of the view-point in meters in the global reference coordinate system, as defined in ISO/IEC 23090-10:2022, subclause 10.2.1.2. The values shall be expressed in 32-bit binary floating point format with the 4 bytes in big-endian order and with the parsing process as specified in IEEE 754.
vp_pos_z	SignedInt	Indicates the z-coordinate of the position of the viewpoint in meters in the global reference coordinate system, as defined in ISO/IEC 23090-10:2022, subclause 10.2.1.2. The values shall be expressed in 32-bit binary floating point format with the 4 bytes in big-endian order and with the parsing process as specified in IEEE 754.

Table 6 (continued)

Key	Туре	Description
vp_quat_x	Integer	Indicates the x component of the rotation of the viewpoint region using the quaternion representation, as defined in ISO/IEC 23090-10:2022, subclause 10.2.1.2. The values shall be a floating-point value in the range of −1 to 1, inclusive.
vp_quat_y	Integer	Indicates the y component of the rotation of the viewpoint region using the quaternion representation, as defined in ISO/IEC 23090-10:2022, subclause 10.2.1.2. The values shall be a floating-point value in the range of −1 to 1, inclusive.
vp_quat_z	Integer	Indicates the z component of the rotation of the viewpoint region using the quaternion representation, as defined in ISO/IEC 23090-10:2022, subclause 10.2.1.2. The values shall be a floating-point value in the range of — to 1, inclusive.
vp_center_view_flag	Booelan	As defined in ISO/IEC 23090-10:2022, subclause 10.2.3.2: Value equal to 1 indicates that the viewpoint position signalled corresponds to the center of the viewport. Value equal to 0 indicates that the viewpoint position signalled corresponds to one of two stereo positions of the viewpoint.
vp_left_view_flag	Boolean	As defined in ISO/IEC 23090-10:2022, subclause 10.2.3.2: Value equal to 1 indicates that the viewpoint information signalled correspond to the left stereo position of the viewpoint. Value equal to 0 indicates that the viewpoint information signalled correspond to the right stereo positions of the viewport.
viewport_type	Integer	Specifies the type of the viewport as listed in ISO/IEC 23090-10:2022, subclause 10.3.2.3, Table 11.

Renumber previous Tables 2 to 6 as Tables 7 to 11 respectively.

Clause 7

Add the following subclause at the end of the clause:

7.6 OMAF viewpoint switching latency

The viewpoint switching latency metric reports the latency experienced by the user when switching to a target viewport not being rendered until a viewport of the target viewpoint is rendered.

The viewpoint switching latency metric is specified in Table 12.

Table 12 — Viewpoint switching latency

Key	Туре	Description
ViewpointSwitchingLatency	List	List of viewpoint switching laten- cies
Entry	Object	
originViewpoint	OmnidirectionalViewportDataType	Specifies the spherical region corresponding to a viewport of the origin viewpoint (i.e., before switching).
targetViewpoint	OmnidirectionalViewportDataType	specifies the spherical region corresponding to a viewport of target viewpoint (i.e., after the switching).
t	Real-Time NEC 23030	Specifies the measurement time of the viewpoint switching latency in wall-clock time.
latency	Real-Time Integer Integer item the full PDF of 150 IEC 230 90 16:72	Specifies the delay in milliseconds between the time when switching from a source viewpoint to the target viewpoint is initiated, as specified in subclause 8.4, and the time when content corresponding to the target viewpoint is reflected on the display.

Clause 8

Add the following subclause at the end of the clause:

8.4 OMAF viewpoint switching latency metric measurement

A potential viewpoint switch event is detected when a network request is made for a segment from a representation of a new viewpoint, whose representations are not currently being rendered, in response to an explicit user request or the user's interaction with the scene. In the case of sub-picture-based viewport-dependent streams, one or more segments corresponding to sub-pictures of the new viewpoint may be requested. The event is finally identified (i.e., completed) when a viewport from the new viewpoint (not currently being rendered) is eventually rendered after the requested segment(s) are downloaded and decoded.

When a potential viewpoint switch is detected, the client creates a record containing the detection time and the target viewpoint and adds this record to an in-memory data structure (e.g., a list) that keeps track of all pending viewpoint switching measurements. When rendering module renders a viewport with a new viewpoint ID that is different from the viewpoint ID of the preceding rendered viewport, the