FINAL
DRAFT

AMENDMENT

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Information technology — Coded representation of immersive media —

Part 14: Scene description

AMENDMENT 1: Support for immersive media codecs in scene description

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

A list of all parts in the ISO/IEC 23090 series can be found on the ISO and IEC websites.

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Normative references

Add the following references:

ISO/IEC 23090-5, *Information technology — Coded Representation of Immersive Media — Part 5: Visual Volumetric Video-based Coding (V3C) and Video-based Point Cloud Compression (V-PCC)*

4.2

Replace Figure 1 by the following figure

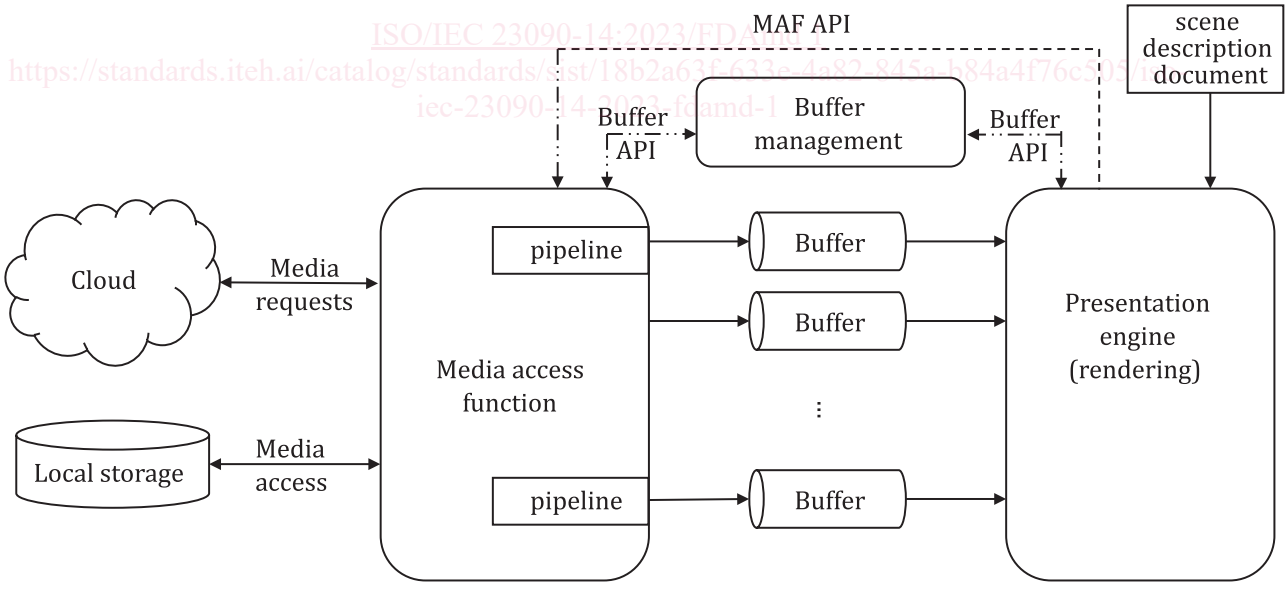

Figure 1 — Scene description reference architecture

3.2

Add the following to the list of abbreviated terms in subclause 3.2:

MIV MPEG immersive video

ERP Equirectangular projection

PLR Point Local Reconstruction

EOM Enhanced Occupancy Mode

5.1.1

Add the following sentence after Figure 3

Additional extensions and buffer formats for the support of MPEG-specified immersive media formats in MPEG-I scene description are specified in Annex G.

5.3.1.2, Table 11

Change the Description of the format attribute as follows:

format	string	RGB	O	Indicates the format of the pixel data for this video texture. The allowed values are: RED, GREEN, BLUE, RG, RGB, RGBA, BGR, BGRA, DEPTH_COMPONENT. The semantics of these values are defined in Table 8.3 of OpenGL specification [2]. Additionally, YCbCr formats are supported. The semantics for the YCbCr formats are defined in Table 76 in Vulkan specification [Vulkan 1.3]. A sampler with the `MPEG_sampler_YCbCr` extension shall be linked to a YCbCr texture. The number of components shall match the type indicated by the referenced accessor. Normalization of the pixel data shall be indicated by the normalized attribute of the accessor.

5.2.1.2, Table 6,

Change the Description of the track attribute as follows:

Table 6 — Definitions of items in the tracks array of MPEG_media.alternative extension

Name	Type	Default	Usage	Description
track	string	N/A	M	URL fragment to access the track within the media alternative. The URL structure is defined for the following formats: DASH: Using MPD Anchors (URL fragments) as defined in ISO/IEC 23009-1:2019:Annex C (Table C.1). ISOBMFF: URL fragments as specified in ISO/IEC 14496-12:2020:Annex C. SDP: stream identifier of the media stream as defined in Annex C. When V3C data is referenced in the scene description document as in item in MPEG_media.alternative.tracks and the referenced item corresponds to an ISBOBMFF track, the following applies: — For single-track encapsulated V3C data, the referenced track in MPEG_media shall be the V3C bitstream track. — For multi-track encapsulated V3C data, the referenced track in MPEG_media shall be the V3C atlas track. When G-PCC data is referenced by the scene description file as an item in MPEG_media.alternative.tracks and the referenced item complies with the provisions of track in ISOBMFF, the following applies: — For single-track encapsulated G-PCC data, the track referenced in MPEG_media shall be the G-PCC bitstream track; — For multi-track encapsulated G-PCC data, the track referenced in MPEG_media shall be the G-PCC geometry bitstream track.
codecs	string	N/A	M	The codecs parameter, as defined in IETF RFC 6381, of the media included in the track. When the track includes different types of codecs (e.g. the AdaptationSet includes Representations with different codecs), the codecs parameter may be signaled by comma-separated list of values of the codecs.

Annex B

Add the following entries to Table B.1 in Annex B:

Table B.1 — MPEG attribute registry

Name	Accessor type(s)	Component type(s)	Description	Reference and example shader program
_MPEG_V3C_ATTR_REFLECTANCE	scalar	5123	indicates the reflectance information that is associated with each point in a volumetric frame	
_MPEG_V3C_ATTR_MATERIAL_ID	scalar	5123	indicates a supplemental information that identifies material type of a point in a volumetric frame	
_MPEG_V3C_ATTR_TRANSPARENCY	scalar	5123	indicates the transparency information that is associated with each point in a volumetric frame	

Annex F

Add the following subclauses to Annex F:

F.10 MPEG_primitive_V3C

In the example downloadable from https://standards.iso.org/iso-iec/23090/-14/ed-1/en/amd/1/example_MPEG_primitive_V3C, a usage of the `MPEG_primitive_V3C` is presented.

F.11 MPEG_sampler_YCbCr

In the example downloadable from https://standards.iso.org/iso-iec/23090/-14/ed-1/en/amd/1/example_MPEG_sampler_YCbCr, a usage of the `MPEG_sampler_YCbCr` extension is presented.

Add Annex G with the following content

Annex G
(normative)

Support for MPEG-I Media

G.1 MPEG_primitive_V3C extension

G.1.1 General

In order to support V3C compressed objects in MPEG-I scene description, the `MPEG_media` extension is used to refer to V3C compressed bitstreams.

The presentation engine may support the operations to perform the 3D reconstruction of decoded V3C components as indicated in the Figure 2. The presentation engine accesses the decoded V3C data through buffers.

The syntax of the V3C object is provided as an extension to `mesh.primitive` in a scene description format. The extension refers to the decoded data of a V3C object. Each decoded V3C component is signalled using properties defined in the `MPEG_primitive_V3C` extension. The extension is specific to objects coded with a V3C compression scheme (i.e., ISO/IEC 23090-5 or ISO/IEC 23090-12).

Usage of the extension shall be listed in the *`extensionsUsed`* top-level glTF property.

```
"extensionsUsed": [
    "MPEG_primitive_V3C"
]
```

Figure G.1 depicts the structure of the V3C mesh compression extension:

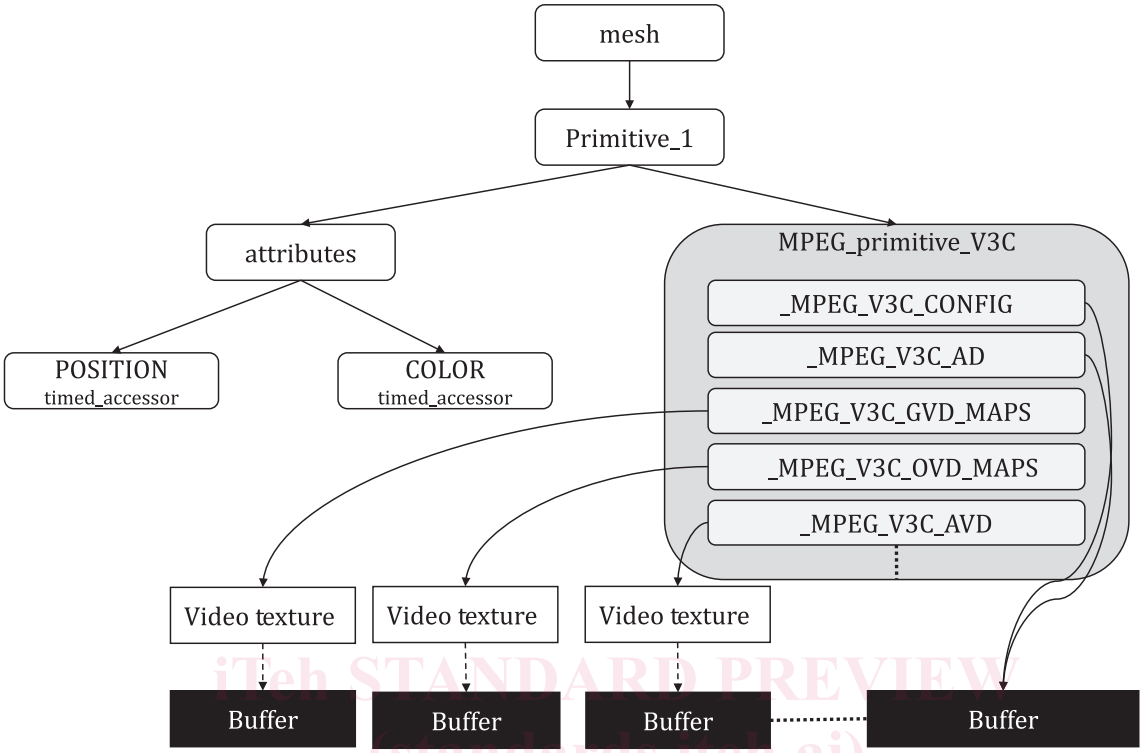

Figure G.1 — Example structure of V3C compressed primitive

If the Presentation Engine does not support the MPEG_primtive_V3C extension, It shall request the reconstructed raw data as described by the primitive attributes.

G.1.2 Semantics

An `MPEG_primitive_V3C` extension refers to several V3C components, containing the decoded projected maps and metadata necessary such as atlas data for the 3D reconstruction process.

Table G.1 provides a list of the possible components and their description:

Table G.1 — MPEG_primitive_V3C properties

Name	Type	Default	Usage	Description
_MPEG_V3C_CONFIG	integer	N/A	M	This component provides a reference to a timed accessor that contains configuration information that is applicable to a sequence of frames of the V3C decoded mesh primitive. The binary format of the configuration buffer is provided in clause G.1.3.
Legend: For attributes: M=mandatory, O=optional, OD=optional with default value, CM=conditionally mandatory.				

Table G.1 *(continued)*

Name	Type	Default	Usage	Description
_MPEG_V3C_AD	object	N/A	M	this component shall reference a timed accessor that provides the V3C atlas data buffer. The atlas buffer format is defined in clause G.1.4. Future specifications of the atlas data buffer format shall use a different version. Exactly one atlas component shall be present, irrespective of the version.
_MPEG_V3C_GVD_MAPS	array(integer)	N/A	M	this component shall provide an array of video texture references, each of which corresponds to one map of the decoded geometry video data.
_MPEG_V3C_OVD_MAP	integer	N/A	O	this component shall provide a video texture reference, which corresponds to the decoded occupancy video data map.
_MPEG_V3C_AVD	array(object)	N/A	O	this component shall provide an array of objects, each of which describing an attribute component of the V3C compressed mesh primitive. The properties of the components are described in Table G.2.
_MPEG_V3C_CAD	object	N/A	CM	This object lists different properties described for the Common Atlas Data in ISO/IEC 23090-5.
Legend: For attributes: M=mandatory, O=optional, OD=optional with default value, CM=conditionally mandatory.				

The `_MPEG_V3C_AD` object shall have the structure as describe in Table G.2:

Table G.2 — Properties of _MPEG_V3C_AD object

Name	Type	Default	Usage	Description
buffer_format	string	"baseline"	O	provides an identifier of the associated atlas data buffer format. A list of supported atlas data buffer formats is provided in Table G.4.
accessor	integer	N/A	M	This provides the index of the timed accessor that provides access to the atlas data buffer.

The `_MPEG_V3C_AVD` object shall have the following structure: