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Information technology — Coding of audio-visual objects —

Part 4: Conformance testing

AMENDMENT 12: Morphing & Textures conformance

Technologies de l'information — Codage des objets audiovisuels —

Partie 4: Essai de conformité

AMENDEMENT 12: Conformité de morphage et de textures

Reference number
ISO/IEC 14496-4:2004/Amd.12:2007(E)

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Amendment 12 to ISO/IEC 14496-4:2004 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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Information technology — Coding of audio-visual objects —

Part 4:
Conformance testing

AMENDMENT 12: Morphing & Textures conformance

In subclause 8.4.2.2.1, add the following table at the end of Table AMD 7-4 and renumber the first column:

N°	Feature	Reference of Test sequence and associated method
1	MorphSpace	cube2sphere_morph_cube.mp4 cube2sphere_morph_dome.mp4 cube2sphere_morph_etoile.mp4 cube2sphere_morph_forme.mp4 cube2sphere_morph_sphere.mp4 cube2sphere_morph_random.mp4 cube2sphere_morph_anim.mp4
2	DepthImageV2	This node shall be tested together with SimpleTextureV2 nodes and PointTextureV2 node.
3	SimpleTextureV2	shuttle.mp4
4	PointTextureV2	flower.mp4
5	Multitexturing	tm.mp4
6	SBVCAnimationV2	VCAnimV2.mp4

In subclause 8.4.2.3, add the following table at the end of the table:

Name	Provider	Content	Original wrl file
cube2sphere_morph_cube.mp4	INT-ARTEMIS	**MorphShape** node test: static mesh obtained by morphing one base shape and four target shapes with weights 0 0 0 0	cube2sphere_morph_cube.txt
cube2sphere_morph_dome.mp4	INT-ARTEMIS	**MorphShape** node test: static mesh obtained by morphing one base shape and four target shapes with weights 0 1 0 0	cube2sphere_morph_dome.txt
cube2sphere_morph_etoile.mp4	INT-ARTEMIS	**MorphShape** node test: static mesh obtained by morphing one base shape and four target shapes with weights 0 0 1 0	cube2sphere_morph_etoile.txt
cube2sphere_morph_forme.mp4	INT-ARTEMIS	**MorphShape** node test: static mesh obtained by morphing one base shape and four target shapes with weights 0 0 0 1	cube2sphere_morph_forme.txt
cube2sphere_morph_sphere.mp4	INT-ARTEMIS	**MorphShape** node test: static mesh obtained by morphing one base shape and four target shapes with weights 1 0 0 0	cube2sphere_morph_sphere.txt

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cube2sphere_morph_random.mp4	INT-ARTEMIS	**MorphShape** node test: static mesh obtained by morphing one base shape and four target shapes with weights 0.3 0.5 0.1 0.1	cube2sphere_morph_random.txt
cube2sphere_morph_anim.mp4	INT-ARTEMIS	**MorphShape** node and BBA stream test: animated mesh obtained by morphing into a morph space with one base shape and four target shapes.	cube2sphere_morph_anim.txt
shuttle.mp4	ETH Zurich	**DIBR2**: **SimpleTextureV2** node test: shuttle with novel fields (normal, splatU/V)	shuttle.wrl
flower.mp4	ETH Zurich	**DIBR2**: **PointTextureV2** node test: flower with novel fields (normal, splatU/V)	flower.wrl
tm.mp4	FhG-HHI	**MultiTexture** and **MultiTextureCoord** node test: 3D Temple model with 4 Textures	tm.wrl
VCAnimV2.mp4	INT-ARTEMIS	**SBVCAnimationV2** node test: animation of a virtual character by using advanced control.	VCAnimV2.txt
DI-PT-pos-ori-fov-plane-ortho.mp4	SAMSUNG AIT	**DepthImage** node with exposedFields (position, orientation, fieldofview, nearplane, farplane and orthographic) for PointTexture node	DI-PT-pos-ori-fov-plane-ortho.wrl
DI-ST-fov-pos-plane.mp4	SAMSUNG AIT	**DepthImage** node with exposedFields (fieldofview, orientation, nearplane and farplane) for SimpleTexture node	DI-ST-fov-pos-plane.wrl
DI-ST-ori-plane-fov.mp4	SAMSUNG AIT	**DepthImage** node with exposedFields (orientation, nearplane, farplane and fieldofview) for SimpleTexture node	DI-ST-ori-plane-fov.wrl

Add the following subclauses after subclause 8.5.7:

8.5.8 PointTexture Bitstream Specification

PointTexture node in ISO/IEC 14496-16 has the depth information and the color information. PointTexture represents an object with an array of pixels viewed from a single camera location. Each PointTexture pixel is represented by its color, depth (the distance from the pixel to the camera), and a few other properties assisting PointTexture rendering. There can be multiple pixels along each line of sight, and thus a PointTexture usually consists of multiple layers. A PointTexture typically contains a large amount of data: a realistic image requires a higher sampling density and a huge amount of data. Therefore, the compression of PointTexture images should be done efficiently.

The PointTexture compression is a tool to compress the PointTexture node efficiently.

8.5.8.1 Conformance Points

8.5.8.1.1 Covered functionalities

The conformance points for PointTexture compression cover lossless compression and lossy compression. These functionalities relate to the compressed representation of PointTexture node carried by BitWrapper node as described in ISO/IEC 14496-11.

As for carriage of compressed representation of PointTexture node using BitWrapper node, it can be carried either in a separate stream or within the scene stream (BIFS stream). Therefore, PointTexture compression shall also be tested together with this node.

The following subclauses specify the normative tests for verifying the conformance of PointTexture compressed bitstreams and PointTexture decoder. Those normative tests make use of test data (bitstream test suites).

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8.5.8.2 Bitstream conformance

8.5.8.2.1 Conformance Requirements

BIFS streams shall comply with the specifications for PointTexture compression in ISO/IEC 14496-16 and BitWrapper in ISO/IEC 14496-11.

8.5.8.2.2 Measurement procedure

Syntax of the BIFS stream shall meet the requirements of PointTexture compression in ISO/IEC 14496-16 and BitWrapper in ISO/IEC 14496-11.

8.5.8.2.3 Tolerance

There is no tolerance for bitstream syntax checking. The diagnosis is pass or fail.

8.5.8.3 Terminal conformance

8.5.8.3.1 Conformance Requirements

A compliant decoder shall implement a decoding process that is equivalent to the one specified in ISO/IEC 14496-16 and meets all the general requirements, defined in the document, which apply for the functionalities considered. The decoder shall decode bitstreams with any options or parameters with values permitted for the functionalities. In the case of using BIFS for scene representation, the decoding process that is specified in ISO/IEC 14496-1:2004 shall also be implemented.

8.5.8.3.2 Test Bitstreams

Purpose 1 (URL): Exercise the lossless and lossy compression functionality of MPEG-4 PointTexture compression carried in a separate stream from the scene stream.

Purpose 2 (Buffer): Exercise the lossless and lossy compression functionality of MPEG-4 PointTexture compression carried in the scene stream.

File:

Test Name	Attribute	Bitstream (.mp4)	Reference file (.txt - DIBR only)
PT#1-1	Use of URL field in the Bitwrapper node. Use of lossless compression (nPercentOfDecoding is set to 100)	PT-object #1-1	PT-object#1-1
PT#1-2	Use of URL field in the Bitwrapper node. Use of lossy compression (nPercentOfDecoding is set to 99)	PT-object #1-2	PT-object#1-2
PT#2-1	Use of buffer field in the Bitwrapper node. Use of lossless compression (nPercentOfDecoding is set to 100)	PT-object #2-1	PT-object#2-1
PT#2-2	Use of buffer field in the Bitwrapper node. Use of lossy compression (nPercentOfDecoding is set to 99)	PT-object #2-2	PT-object#2-2

8.5.8.3.3 Measurement Procedure

The terminal should produce a formatted output giving the reconstructed fields of PointTexture. The decoder shall be able to decode the bitstreams provided as described in subclause 8.5.8.3.2.

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8.5.8.3.4 Tolerance

The diagnosis is to check whether the field data (depth, color, width, height, depthNbBits) of PointTexture node that is decoded from ".mp4" files correspond with the node included in the provided reference ".txt" files.

8.5.9 BBA stream updates for Morph-based animation

The BBA stream syntax was updated in ISO/IEC 14496-16 in order to represent in a BBA animation frame, the values of the weights associated to each target shape in a MorphShape node. The morph is the third surface deformer that can be represented in a BBA data (with bones and muscles). A BBA animation frame can contain data for several MorphShape nodes.

8.5.9.1 Conformance Points

8.5.9.1.1 Covered functionalities

The following subclauses specify the normative tests for verifying conformance of BBA compressed bitstream and BBA decoder. Those normative tests make use of test data (bitstream test suites).

8.5.9.2 Bitstream conformance

8.5.9.2.1 Conformance Requirements

BBA streams shall comply with the specifications for BBA compression in ISO/IEC 14496-16 Texture and Morphing.

8.5.9.2.2 Measurement procedure

Syntax of the BBA stream shall meet the requirements of BBA compression in ISO/IEC 14496-16 Texture and Morphing.

8.5.9.2.3 Tolerance

There is no tolerance for bitstream syntax checking. The diagnosis is pass or fail.

8.5.9.3 Terminal conformance

8.5.9.3.1 Conformance Requirements

A compliant decoder shall implement a decoding process that is equivalent to the one specified in ISO/IEC 14496-16 Morphing and Texture and meets all the general requirements, defined in the document, which apply for the functionalities considered. The decoder shall decode bitstreams with any options or parameters with values permitted for the functionalities. In the case of using BIFS for scene representation, the decoding process that is specified in ISO/IEC 14496-1:2004 shall also be implemented.

8.5.9.3.2 Test Bitstreams

File:

Test Name	Attribute	Bitstream (.mp4)	Reference file
MorphAnim	Animation of a morph space with one base shape and four target shapes consisting in linear transitions between the targets.	cube2sphere_morph_anim.mp4	cube2sphere_morph_anim.txt

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8.5.9.3.3 Measurement Procedure

The terminal should display an animation consisting in the deformation of a textured object.

8.5.9.3.4 Tolerance

There is no tolerance for deforming the object.

8.5.10 MPEG-4 3D Graphics stream

8.5.10.1.1 Conformance Requirements

A compliant decoder shall implement a decoding process that is equivalent to the one specified in subclause 5.7 of ISO/IEC 14496-16 and meets all the general requirements, defined in the document.

8.5.10.1.2 Test Bitstream (*.m3d)

Bitstream name	Provider	Contents
3DGraphicsStream.m3d	SAMSUNG AIT	Multiplexed file to support Core 3D Compression Profile. The multiplexed bitstream consists of 6 different object types defined with “Simple 3DMC”, “Simple BBA”, “Simple OI”, “Simple PI”, “Simple WSS” and “Simple CI”.

8.5.10.1.3 Measurement procedure

The demultiplexer shall be able to demultiplex the bitstreams provided without losing information as described in subclause 8.5.10.1.2. Each compressed output bitstream should be decoded by its corresponding decoder defined in 3D compression profile defined in subclause 7.4 of ISO/IEC 14496-16.

8.5.11 Conformance for X3D Interactive Graphics Profiles and Levels

8.5.11.1.1 Conformance Requirements

A terminal compliant to the X3D Interactive Graphics Profiles and Levels shall be able to render the bitstreams mentioned in this clause.

8.5.11.1.2 Test Bitstream

Bitstream name	Provider	Contents
Anchor - test - simple Anchor.mp4	Web3D Consortium	Anchor, NavigationInfo, Viewpoint, Shape, Appearance, Material, Transform, Sphere. *Note that the Text node in this file can be removed as this node isn't supported by the X3D profile.*
Appearance, Group, Material, Shape, Sphere, Transform, Viewpoint.mp4	Web3D Consortium	Appearance, Group, Material, Shape, Sphere, Transform, Viewpoint
Background - test - wholejpeg.mp4	Web3D Consortium	Background, NavigationInfo, Group, Viewpoint, TimeSensor, PositionInterpolator, OrientationInterpolator, Transform, Appearance, Material, TouchSensor. *Note that the Text node in this file can be removed as this node isn't supported by the X3D profile.*
box default.mp4	Web3D Consortium	Box, NavigationInfo, Shape, Appearance, Material

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box extra-large.mp4	Web3D Consortium	Box, NavigationInfo, Shape, Appearance, Material, Viewpoint
box floats.mp4	Web3D Consortium	Box, NavigationInfo, Shape, Appearance, Material,
Color - 15000colors - Appearance, ElevationGrid, Group, Material, NavigationInfo, Shape, Transform, Viewpoint.mp4	Web3D Consortium	Color, Appearance, ElevationGrid, Group, Material, NavigationInfo, Shape, Transform, Viewpoint
Color Interpolator - 1000keys.mp4	Web3D Consortium	ColorInterpolator, Group, TimeSensor, NavigationInfo, Transform, Shape, Appearance, Material, Sphere
Cone - default.mp4	Web3D Consortium	Cone, NavigationInfo, Shape, Appearance, Material
Coordinate - 15000points_faceset - .IndexedFaceSet.mp4	Web3D Consortium	Coordinate, IndexedFaceSet, Material, NavigationInfo, Shape, Transform, Viewpoint
Coordinate - 15000points_faceset - IndexedFaceSet, Material, NavigationInfo, Shape, Transform, Viewpoint.mp4	Web3D Consortium	Coordinate, IndexedFaceSet, Material, NavigationInfo, Shape, Transform, Viewpoint
Coordinate Interpolator - 1000keys.mp4	Web3D Consortium	ColorInterpolator, Group, TimeSensor, NavigationInfo, Transform, Shape, Appearance, Material, IndexedFaceSet, Coordinate.
Cylinder - default.mp4	Web3D Consortium	Cylinder, NavigationInfo, Shape, Appearance, Material
Cylinder Sensor - default cylinder.mp4	Web3D Consortium	CylinderSensor, NavigationInfo, Group, Viewpoint, DirectionalLight, Transform, Shape, Appearance, Material, IndexedFaceSet, Coordinate, Color
DirectionalLight - default_primitivesdir - PointLight, SpotLight, Appearance, Material, Box, Cone, Cylinder, Sphere, Group, NavigationInfo, Shape, Transform, Viewpoint.mp4	Web3D Consortium	DirectionalLight, PointLight, SpotLight, Appearance, Material, Box, Cone, Cylinder, Sphere, Group, NavigationInfo, Shape, Transform, Viewpoint
Image Texture - 256jpg.mp4	Web3D Consortium	ImageTexture, Box, NavigationInfo, Shape, Appearance, Material
Indexed Line Set - 15000 - Vertices.mp4	Web3D Consortium	IndexedLineSet, NavigationInfo, Viewpoint, Shape, Appearance, Material, Coordinate
Inline - existing - file.mp4	Web3D Consortium	Inline, NavigationInfo, Viewpoint, Shape, Appearance, Material, Box *Note that the Text node in this file can be removed as this node isn't supported by the X3D profile.*

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Plane Sensor - default.mp4	Web3D Consortium	PlaneSensor, Shape, Appearance, Material, Box, Group, Transform
Point Set - 5000points.mp4	Web3D Consortium	PointSet, NavigationInfo, Shape, Appearance, Material, Coordinate
Proximity Sensor - default.mp4	Web3D Consortium	ProximitySensor, Viewpoint, TimeSensor, ColorInterpolator, Shape, Appearance, Material, Transform, Sphere
Scalar Interpolator - simple.mp4	Web3D Consortium	ScalarInterpolator, Background, TimeSensor, Group, Transform, Cylinder, Shape, Appearance, Material, SpotLight
Sphere Sensor - default.mp4	Web3D Consortium	SphereSensor, NavigationInfo, Group, Viewpoint, Transform, Shape, Appearance, Material, Box, IndexedLineSet, Coordinate.
Switch - bound - 500 .mp4	Web3D Consortium	Switch, NavigationInfo, Group, Viewpoint, Transform, Shape, Appearance, Material, TouchSensor, TimeSensor, ColorInterpolator, ScalarInterpolator, Switch, Sphere *Note that the Text and Script nodes in this file can be removed since they are not supported by the X3D profile.*
Texture Coordinate - indexedfaceset imagetexture entire.mp4	Web3D Consortium	TextureCoordinate, NavigationInfo, Viewpoint, Shape, Appearance, Material, ImageTexture, IndexedFaceSet, Coordinate
World Info - title.mp4	Web3D Consortium	WorldInfo, Shape, Box

8.5.11.1.3 Measurement procedure

The terminal should render each file according to the semantic of ISO/IEC 14772 (VRML 2.0) specification.

8.5.12 Conformance for MPEG-4 X3D Interactive Scene Graph Profile and Levels

8.5.12.1.1 Conformance Requirements

A terminal compliant to the X3D Interactive Scene Graph Profiles and Levels shall be able to decode the bitstreams mentioned in this clause.

8.5.12.1.2 Test Bitstream

Bitstream name	Provider	Contents
Anchor - test - simple Anchor.mp4	Web3D Consortium	Anchor, NavigationInfo, Viewpoint, Shape, Appearance, Material, Transform, Sphere. *Note that the Text node in this file can be removed as this node isn't supported by the X3D profile.*
Appearance, Group, Material, Shape, Sphere, Transform, Viewpoint.mp4	Web3D Consortium	Appearance, Group, Material, Shape, Sphere, Transform, Viewpoint

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Background - test - wholejpeg.mp4	Web3D Consortium	Background, NavigationInfo, Group, Viewpoint, TimeSensor, PositionInterpolator, OrientationInterpolator, Transform, Appearance, Material, TouchSensor. *Note that the Text node in this file can be removed as this node isn't supported by the X3D profile.*
box default.mp4	Web3D Consortium	Box, NavigationInfo, Shape, Appearance, Material
box extra-large.mp4	Web3D Consortium	Box, NavigationInfo, Shape, Appearance, Material, Viewpoint
box floats.mp4	Web3D Consortium	Box, NavigationInfo, Shape, Appearance, Material,
Color - 15000colors - Appearance, ElevationGrid, Group, Material, NavigationInfo, Shape, Transform, Viewpoint.mp4	Web3D Consortium	Color, Appearance, ElevationGrid, Group, Material, NavigationInfo, Shape, Transform, Viewpoint
Color Interpolator - 1000keys.mp4	Web3D Consortium	ColorInterpolator, Group, TimeSensor, NavigationInfo, Transform, Shape, Appearance, Material, Sphere
Cone - default.mp4	Web3D Consortium	Cone, NavigationInfo, Shape, Appearance, Material
Coordinate - 15000points_faceset - .IndexedFaceSet.mp4	Web3D Consortium	Coordinate IndexedFaceSet, Material, NavigationInfo, Shape, Transform, Viewpoint
Coordinate - 15000points_faceset - IndexedFaceSet, Material, NavigationInfo, Shape, Transform, Viewpoint.mp4	Web3D Consortium	Coordinate, IndexedFaceSet, Material, NavigationInfo, Shape, Transform, Viewpoint
Coordinate Interpolator - 1000keys.mp4	Web3D Consortium	ColorInterpolator, Group, TimeSensor, NavigationInfo, Transform, Shape, Appearance, Material, IndexedFaceSet, Coordinate.
Cylinder - default.mp4	Web3D Consortium	Cylinder, NavigationInfo, Shape, Appearance, Material
Cylinder Sensor - default cylinder.mp4	Web3D Consortium	CylinderSensor, NavigationInfo, Group, Viewpoint, DirectionalLight, Transform, Shape, Appearance, Material, IndexedFaceSet, Coordinate, Color
DirectionalLight - default_primitivesdir - PointLight, SpotLight, Appearance, Material, Box, Cone, Cylinder, Sphere, Group, NavigationInfo, Shape, Transform, Viewpoint.mp4	Web3D Consortium	DirectionalLight, PointLight, SpotLight, Appearance, Material, Box, Cone, Cylinder, Sphere, Group, NavigationInfo, Shape, Transform, Viewpoint
Image Texture - 256jpg.mp4	Web3D Consortium	ImageTexture, Box, NavigationInfo, Shape, Appearance, Material

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Indexed Line Set - 15000 - Vertices.mp4	Web3D Consortium	IndexedLineSet, NavigationInfo, Viewpoint, Shape, Appearance, Material, Coordinate
Inline - existing - file.mp4	Web3D Consortium	Inline, NavigationInfo, Viewpoint, Shape, Appearance, Material, Box *Note that the Text node in this file can be removed as this node isn't supported by the X3D profile.*
Plane Sensor - default.mp4	Web3D Consortium	PlaneSensor, Shape, Appearance, Material, Box, Group, Transform
Point Set - 5000points.mp4	Web3D Consortium	PointSet, NavigationInfo, Shape, Appearance, Material, Coordinate
Proximity Sensor - default.mp4	Web3D Consortium	ProximitySensor, Viewpoint, TimeSensor, ColorInterpolator, Shape, Appearance, Material, Transform, Sphere
Scalar Interpolator - simple.mp4	Web3D Consortium	ScalarInterpolator, Background, TimeSensor, Group, Transform, Cylinder, Shape, Appearance, Material, SpotLight
Sphere Sensor - default.mp4	Web3D Consortium	SphereSensor, NavigationInfo, Group, Viewpoint, Transform, Shape, Appearance, Material, Box, IndexedLineSet, Coordinate.
Switch - bound - 500 .mp4	Web3D Consortium	Switch, NavigationInfo, Group, Viewpoint, Transform, Shape, Appearance, Material, TouchSensor, TimeSensor, ColorInterpolator, ScalarInterpolator, Switch, Sphere *Note that the Text and Script nodes in this file can be removed since they are not supported by the X3D profile.*
Texture Coordinate - indexedfaceset imagetexture entire.mp4	Web3D Consortium	TextureCoordinate, NavigationInfo, Viewpoint, Shape, Appearance, Material, ImageTexture, IndexedFaceSet, Coordinate
World Info - title.mp4	Web3D Consortium	WorldInfo, Shape, Box

8.5.12.1.3 Measurement procedure

For each file, the terminal should have a memory representation of a tree where each leaf is compliant to an ISO/IEC 14772's Node and each node an ISO/IEC 14472 Group or Transform Node. Each node should have its properties set according to the values in each file.

8.5.13 Conformance for Core 3D Compression Profile

8.5.13.1.1 Conformance Requirements

A compliant decoder shall implement a decoding process that is equivalent to the one specified in ISO/IEC 14496-16 and meets all the general requirements, defined in the document. The decoder shall decode bitstreams mentioned in this clause.

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8.5.13.1.2 Test Bitstream

The test bitstreams are formatted (*.m3d) format shall comply with the specifications in ISO/IEC 14496-16. Each test bitstream includes various types of object types listed in following table.

Bitstream name	Provider	Contents
Core_level1.m3d	SAMSUNG AIT	Core 3D Compression Profile/Level 1
Core_Level2.m3d	SAMSUNG AIT	Core 3D Compression Profile/Level 2

- Core_level1.m3d

No	Object Types	Bitstream	Features
1	Simple 3DMC	3DMC_level1.m3d	number of Triangle = 12, number of Vertex = 8, number of Color=8
2	Simple PI	PI_level1.m3d	number of Keys = 11
3	Simple OI	OI_level1.m3d	number of Keys = 50
4	Simple BBA	bba_level1.bba	number of Frame=16

- Core_Level2.m3d

No	Object Types	Bitstream	Features
1	Simple 3DMC	3dmc_color_normal_level2.m3d	number of triangle = 1536, number of Vertex =766, number of Normal=766, number of Color=766
2	Simple 3DMC	3dmc_texture_level2.m3d	number of Triangle = 1536, number of Vertex =766, number of Texcoord=766
3	Simple CI	CI_level2.m3d	number of Keys = 20, number of Vertices = 500
4	Simple PI	PI_level2.m3d	number of Keys = 11
5	Simple OI	OI_level2.m3d	number of Keys = 50
6	Simple BBA	bba_level2.bba	number of Of Frame=16

8.5.13.1.3 Measurement procedure

The terminal should give a list of elementary bitstreams containing object type listed for each level. Each elementary stream should be decoded by its corresponding decoder defined in Core 3D Compression profile in ISO/IEC 14496-16.

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